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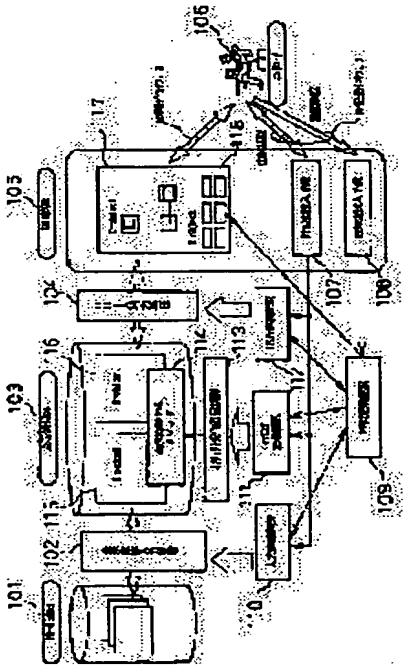
(54) DEVELOPMENT SUPPORT SYSTEM FOR DATA BASE INFORMATION VISUALIZING AP

(57)Abstract:
PURPOSE: To provide a development support system for data base information visualizing AP which enables a user to easily describe the information unit (display entity) definition of a graphic expression extracted from information stored in a DB.
CONSTITUTION: The information visualizing AP is easily developed by a display entity input means 102 for input of the display entity from the data base, a mapping definition means related to generation of attribute information related to type selection, shapes, and arrangement of picture objects, a scenario definition means for execution opportunities and the sequence of mapping definition, an interactive definition and execution means for the mapping definition means and the scenario definition means, an advance registration type definition and execution means, and an input/output GUI tool selecting means.



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CLAIMS

[Claim(s)]
[Claim 1] The display stereo which is the information unit of arbitration is chosen from the alphabetic character and numerical information accumulated in a database. By creating the attribute information about the configuration of a screen object required for a visualization, or arrangement using the attribute information on this display stereo, and mapping the information in the screen object of the GUI tool of an indicating equipment In the development support system of visualization AP which carries out graphical representation of the display stereo by the object of a graph node mold and a line mold A means to input a display stereo from a database, and screen object type selection, and a configuration and the mapping definition means about the attribute information generation about arrangement, The scenario definition means of the activation opportunity of a mapping definition, or sequence, and interactive definition / activation means, and a prior registration type definition and an activation means of a mapping definition or a scenario definition, The database information visualization AP development support system characterized by having the selection means of the GUI tool for I/O.
[Claim 2] The database information visualization AP development support system according to claim 1 which carries out [having had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input , or a screen by make the schema definition of the database of an input side , the schema definition of the display stereo of an output side , and mapping during both schemas definition into a script , when a display stereo is choose from the alphabetic character and the numerical information accumulate in a database in the display stereo input means of said system , and] as the description .
[Claim 3] In the display stereo input means of said system, when carrying out graphical representation of an alphabetic character and the numerical information, the selected display stereo The screen object which is an object of the node mold which expresses with the rectangle on the screen of an indicating equipment, a cube, etc., Or it realizes by making it correspond to one of the screen objects of the screen object of the line mold expressed with the chain of a straight line and a straight line etc. Mapping of the node mold of this display stereo and a screen object or a line mold is made into a script. The database information visualization AP development support system according to claim 1 characterized by having one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input, or a screen.
[Claim 4] the database information visualization AP development support system according to claim 1 which characterize in the display stereo input means of said system by have one of means at least among the means which carry out a selection input as a parameter on the means which carry out a description input , or a screen by make into a script mapping of the information which the display attribute generation method for display attribute generation and this method use for display attribute generation when generate the display attribute which be the attribute information about the configuration of a screen object , or arrangement
[Claim 5] The database information visualization AP development support system according to claim 1 characterized by having the means which carries out the description input of the

activation opportunity of the macro definition of the execution sequence of said mapping definition, and macro definition as a scenario in the scenario definition means of the activation opportunity of a mapping definition of said system, or sequence when a prior registration type definition and an activation means describe AP.
[Claim 6] The database information visualization AP development support system according to claim 1 characterized by defining the generated display information by user assignment as a standard display information object independent of the GUI tool of a proper, and performing two steps of signal transduction of a display stereo, a display information object and a display information object, and a screen object in the selection means of the GUI tool for I/O of said system.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention maps the information on the alphabetic character accumulated in a database, or a numeric value in the object of the node mold on a screen, and the object of a line mold, and relates configurations, such as a form of each object, a color, and magnitude, and an arrangement coordinate to the database information visualization AP development support system which supports generation and the development of information visualization AP to display using the attribute information on a database.
[0002]
[Description of the Prior Art] In the system which carries out a visualization, the information on the conventional DB (database) (1) The table output of the alphabetic character and the numerical information of the table image of a relational database can be simply carried out in menu manipulation with text. The database front system which can also customize a screen, the system which can display the numeric data on (2) relational databases or a spreadsheet as a graph of various patterns by menu manipulation, (3) Color display of the numerical information, such as measurement results, such as a statistics processing software package, spreadsheet software, and earth environment, is carried out at many dimensions. By various information filtering processings, the numeric data visualization system which can be analyzed many-sided, (4) Nodes and line objects, such as a communication network and a network of railroads, are stuck on a map. Transform the color of an object etc. according to the condition of the object in the real world, or There are a network information management tool which expands the selected field, or chooses an object and displays the content of a detail, a graphical representation tool which can choose the style corresponding to the expression pattern based on (5) graph algorithm.
[0003]
[Problem(s) to be Solved by the Invention] However, the display stereo which is the information unit of arbitration is chosen from the alphabetic character and numerical information in a database. Map this display stereo in the object of a node mold or a line mold, and it is expressed a graphic form table. Information visualization AP which can generate the information about the configuration of the object, or arrangement based on the attribute of object information The environment where information visualization AP can be realized only by a user specifying the parameter of the attribute information which an attribute information generation method and a method refer to with the interactive mode or a prior registration mold, and a method does not have the conventional example.
[0004] The 1st object of this invention is to offer the database information visualization AP development support system with which a user can describe simply the information-unit (display stereo) definition of the graphical representation extracted from the information accumulated in DB.
[0005] The mapping definition related to with what kind of graphic form the 2nd object of this invention expresses a display stereo, Namely, the definition about mapping between (1) display stereo and a screen object mold, (2) The definition about the attribute information on the display

stereo used for attribute information generation by the method about the attribute information generation about the configuration of a screen object, and its method, (3) It is in offering the database information visualization AP development support system with which a user can describe the definition about the attribute information on the display stereo used for arrangement coordinate transformation by the method about the arrangement coordinate transformation about arrangement of a screen object, and its method.
[0006] The 3rd object of this invention is to offer the database information visualization AP development support system with which a user can describe the scenario definition about in which sequence the definition about the graphical representation shown for said 2nd object is performed when.
[0007] The 4th object of this invention is to offer the database information visualization AP development support system with which a user can define the definition shown for said 2nd and 3rd object in both the modes of the interactive mode and a prior definition mold.
[0008] The 5th object of this invention is to offer the database information visualization AP development support system with which a user can choose the GUI (Graphical User Interface) tool to display.
[0009]
[Means for Solving the Problem] In order to attain the above-mentioned object, the database information visualization AP development support system of this invention The display stereo which is the information unit of arbitration is chosen from the alphabetic character and numerical information accumulated in a database. By creating the attribute information about the configuration of a screen object required for a visualization, or arrangement using the attribute information on this display stereo, and mapping the information in the screen object of the GUI tool of an indicating equipment In the development support system of visualization AP which carries out graphical representation of the display stereo by the object of a graph node mold and a line mold A means to input a display stereo from a database, and screen object type selection, and a configuration and the mapping definition means about the attribute information generation about arrangement, Let it be a summary to have the scenario definition means of the activation opportunity of a mapping definition, or sequence, interactive definition / activation means of a mapping definition or a scenario definition, and a prior registration type definition and an activation means, and the selection means of the GUI tool for I/O.
[0010] Moreover, the database information visualization AP development support system of this invention carries out having had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input, or a screen by making schema definition of the database of an input side, schema definition of the display stereo of an output side, and mapping during both schemas definition into a script as a summary in said display stereo input means, when choosing a display stereo from the alphabetic character and the numerical information accumulated in a database.
[0011] Furthermore, the database information visualization AP development support system of this invention In said display stereo input means, when carrying out graphical representation of an alphabetic character and the numerical information, the selected display stereo The screen object which is an object of the node mold which expresses with the rectangle on the screen of an indicating equipment, a cube, etc., Or it realizes by making it correspond to one of the screen objects of the screen object of the line mold expressed with the chain of a straight line and a straight line etc. Let it be a summary to have had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input, or a screen by making mapping of the node mold of this display stereo and a screen object, or a line mold into a script.
[0012] The database information visualization AP development support system of this invention carries out having had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input , or a screen as a summary in said display stereo input means by making into a script mapping of the information which the display attribute generation method for display attribute generation and this method use for display attribute generation , when generating the display attribute which is the attribute

information about the configuration of a screen object , or arrangement .
[0013] Moreover, in the scenario definition means of the activation opportunity of said mapping definition, or sequence, the database information visualization AP development support system of this invention makes it a summary to have had the means which carries out the description input of the activation opportunity of the macro definition of the execution sequence of said mapping definition, and macro definition as a scenario, when a prior registration type definition and an activation means describe AP.
[0014] Furthermore, in the selection means of said GUI tool for I/O, the database information visualization AP development support system of this invention defines the generated display information by user assignment as a standard display information object independent of the GUI tool of a proper, and makes it a summary to perform two steps of signal transduction of a display stereo, a display information object and a display information object, and a screen object.
[0015]
[Function] In the database information visualization AP development support system of this invention The display stereo input means from a database, and screen object type selection, and a configuration and the mapping definition means about the attribute information generation about arrangement, Information visualization AP can be simply developed with the scenario definition means of the activation opportunity of a mapping definition, or sequence, the interactive ruler and activation means of this mapping definition means and a scenario definition means, and a prior registration type definition and an activation means, and the selection means of the GUI tool for I/O.
[0016] Moreover, in the database information visualization AP development support system of this invention, when choosing a display stereo from the alphabetic character and numerical information accumulated in DB in said display stereo input means, by making schema definition of the database of an input side, schema definition of the display stereo of an output side, and mapping during both schemas definition into a script, a description input is carried out or a selection input is carried out as a parameter on a screen.
[0017] Furthermore, it realizes by making it correspond to one of the screen objects of the screen object which is an object of a node mold, or the screen object of a line mold, and when carrying out graphical representation of an alphabetic character and the numerical information in said display stereo input means, the selected display stereo carries out a description input, or carries out a selection input as a parameter on a screen in the database information visualization AP development support system of this invention by making mapping of the node mold of this display stereo and a screen object, or a line mold into a script.
[0018] When generating a display attribute in said display stereo input means, in the database information visualization AP development support system of this invention, by making into a script mapping of the information which the display attribute generation method for display attribute generation and this method use for display attribute generation, a description input is carried out or a selection input is carried out as a parameter on a screen.
[0019] Moreover, in the database information visualization AP development support system of this invention, when a prior registration type definition and an activation means describe AP in the scenario definition means of the activation opportunity of said mapping definition, or sequence, a description input is carried out, using the activation opportunity of the macro definition of the execution sequence of a mapping definition, and macro definition as a scenario.
[0020] Furthermore, the database information visualization AP development support system of this invention defines the generated display information by user assignment as a standard display information object independent of the GUI tool of a proper in the selection means of said GUI tool for I/O, and two steps of signal transduction of a display stereo, a display information object and a display information object, and a screen object is performed with it.
[0021]
[Example] The example of this invention is explained using a drawing. Drawing 1 is the block diagram showing the configuration of the database information visualization AP development support system concerning one example of this invention. The database information visualization AP development support system shown in this drawing The information source DB101, the

display stereo input means 102, the display information DB103, the GUI (Graphical User Interface) I/O means 104, GUI equipment 105, an end user 106, the interactive charge means 107, the registration mold charge means 108, The scenario definition translation 109, the input definition translation 110, the mapping definition translation 111, the output definition translation 112, the object actuation communications control 113, the display information generation method 114, E-object 115 (display stereo), and R-object (Display information object) It consists of 116, D-object 117 (screen object), and C-object 118 (control object).

[0022] The information source DB101 is set to DB in which the alphabetic character and numerical information of the structure where he is not specially conscious of the stereo of a display are accumulated. If the display stereo input means 102 is performed according to the execute form 110 outputted by translating an input definition from the information source DB101, E-object 115 will be obtained. R-object 116 is generated using the information on E-object 115 based on the execute form 111 outputted by translating a mapping definition. Furthermore, information (display attribute) required for the display of D-object 117 is created on R-object 116 by the display information generation method 114 operated via the object actuation communications control 113 based on a mapping definition. The display attribute of R-object 116 is transmitted to D-object 117 based on the execute form 112 outputted by translating an output definition.

[0023] AP definition of a user carries out the selection charge of the parameter interactively shown by the dialog, a pop up window, etc. from the exclusive window of a KURAFIKARU screen interface. The file output of the scenario description of the text format created with the graphical GUI tool of the interactive charge means 107 which can display a result immediately, and a general purpose is carried out. This file is registered into C-object 118 and it constitutes from the two modes of a registration mold charge means 108 by which the graphic display which followed the scenario at the time of actuation of C-object 118 is carried out.

[0024] Drawing 2 is drawing showing the configuration of said display stereo input means 102 currently used for the database information visualization AP development support system of drawing 1 (when the information source DB is RDB).

[0025] The input definition of a display stereo consists of interactive input definition 201 and registration blocking force definition 202. In the interactive input definition 201, input schema definition and conversion information definition & conversion script description and an output schema definition are, and these definitions are changed into DB retrieval / object generation sentence file by the input definition translation 203. DB retrieval activation section of the display stereo input means 204 performs, and this DB retrieval sentence file is E-object. It is outputted by file format. Furthermore, an object generation sentence is performed by the object generation activation section of the display stereo input means 204, and it is E-object of file format. E-object of the display information DB It is registered by carrying out.

[0026] On the other hand, during AP scenario description of the registration blocking force definition 202, it is E-object. An input request can be described. It translates by the scenario definition translation 205, and this description is E-object. Detection of an input request requires DB retrieval / object generation sentence file of the input definition translation 203. It is transmitted to the GUI I/O means 206, and registers with C-object 117, and the scenario executable statement generated here is C-object. It performs at the time of actuation and is D-object. It is displayed by carrying out.

[0027] Drawing 3 is drawing showing the I/O schema definition and the example of conversion script description in the database information visualization AP development support system of this invention. A definition required for conversion is the input schema definition 301 of the information source DB, the conversion information definition 302 which is needed for conversion, and E-object. It consists of output schema definitions 303. In the conversion information definition 302, it is E-object. A key information definition and E-object It consists of the related definition between classes, an instance calculation information definition, and an attribute permutation definition. The content of conversion is described by the conversion script 304. The fundamental configuration of a conversion script is defined by the three-stage of attribute retrieval, attribute edit, and object generation.

[0028] Drawing 4 is drawing showing the example of a configuration of conversion script functor. A conversion script is classified into fundamental DB retrieval, object generation, attribute edit, and retrieval (example of communication network information) of a field proper. Functor constitutes from an id number of the definition file referred to with an operator, and other additional information (retrieval conditions etc.).
[0029] Drawing 5 is drawing showing the example of a succession definition of the object class in the database information visualization AP development support system of this invention.
[0030] An object class is D-object built on the screen of the display information DB object class 401 and indicating equipment which are built on the display information DB. It is divided roughly into a class (screen object) 402. E-object which accumulates the information chosen from Existing DB in the display information DB object class 401 A class (stereo object) 403 and E-object R-object mapped A class (display information object) 404 and C-object which registers a scenario It is succeeded by the class (control object) 405. A display object class is inherited by the line mold object class 407 expressed with the chain of the node mold object class 406 expressed with a rectangle, a circle, a cube, etc. on GUI, a straight line, and a straight line etc. A screen object class is inherited by each GUI product object class 408 corresponding to a product.
[0031] Drawing 6 is drawing showing the example of the attribute and method definition of the object class in the database information visualization AP development support system of this invention.
[0032] the example of the attribute and method defined as the lowest class as a result of object succession — E-object The attribute and the method definition 501 of a class, and R-object The attribute and the method definition 502 of the node mold object class which is a low order class of a class, the attribute and method definition 503 of the line mold object class which is a low order class of a R-object class, and C-object the attribute and the method definition 504 of a class — it is shown independently. R-object In the low order class of a class, it is D-object. A display attribute required for a display, the reference attribute which defines mapping which shows the attribute relation which a display information generation method uses, and E-object Various display information generation methods are defined as the stereo attribute which inherited the attribute of a class.
[0033] Drawing 7 is drawing showing the example of a configuration of the mapping definition for the display information generation in the database information visualization AP development support system of this invention.
[0034] The information on E-object 601 is E-object-R-object. It is mapped by R-object 603 of a node mold or a line mold according to the mold mapping definition 602. In R-object 603, it is E-object. The stereo attribute 604 and D-object by which the attribute was mapped It consists of a display attribute 605 which is transmitted and is used for a display, and a reference attribute 606 which shows the stereo attribute which a display attribute generation method refers to. If it is decided fixed using which reference attribute signal transduction of each display attribute generation method is carried out and a user describes mapping of a stereo attribute and a reference attribute, a method will generate a display attribute using the mapped stereo attribute. Mapping to the reference attribute of this stereo attribute is D-object. The method about a configuration, the mapping definition 607, and D-object It constitutes from the method and the mapping definition 608 about arrangement.
[0035] Drawing 8 is drawing showing the configuration of the translation and execution control of the mapping definition in the database information visualization AP development support system of this invention.
[0036] It is defined as the interactive mapping definition 701 a definition result is immediately [whose] performed with a graphical interface as a part of scenario with a text file interface, and a mapping definition is C-object. It constitutes from registration mold mapping definition 702 performed after registration. The object actuation communications control section 704 transmits the object actuation message generated by the mapping definition translation 703 to each object, and an interactive mapping definition is performed immediately. On the other hand, the scenario definition translation 705 translates the various mapping definitions where the registration mold

mapping definition was embedded into the scenario, and, as for a mapping definition, a translation and the output of an object actuation message are requested from the mapping definition translation 703. The scenario execute form which combined the scenario and the object actuation message is C-object on GUI equipment by the GUI I/O means 706. Or D-object It is generated and registered. This mapping definition is C-object by a user's menu manipulation. Or D-object When operated, the object actuation communications control section is started and performed.

[0037] Drawing 9 is drawing showing the example of mapping definition description of the registration mold in the database information visualization AP development support system of this invention.

[0038] Mapping definition description is E-object. R-object mapped The object mold allocation definition 801 and R-object which define a mold (a node mold, line mold) It consists of reference attribute pointer setting-out definition 802 which defines the stereo attribute which a reference attribute shows, and a method operational definition 803 which defines the class of display information generation method to be used.

[0039] Drawing 10 is drawing showing the example of description of the parameter definition to which setting out is needed for an actuation method proper in connection with the method operational definition of drawing 9 in the database information visualization AP development support system of this invention.

[0040] In the example 901 of a parameter definition over the actuation method of object configurations, such as deciding the color of an object with the value of a stereo attribute, the mapping approach of the value of a stereo attribute and a color is minced with numeric data at order type, and it is cut value about width of face. color definition defines the sequence of the color mapped. In order type, it can specify "ascending order / descending order / alphabetical order / the order of an internal code / refer to the conversion table", etc. The maximum coordinate to arrange can be specified in the example 902 of a parameter definition over the actuation method of object arrangement, such as deciding the arrangement coordinate of an object with the value of a stereo attribute.

[0041] Drawing 11 is drawing showing the example of user scenario processing description of the registration mold in the database information visualization AP development support system of this invention.

[0042] Setting to drawing 11 , for the scenario processing flow 1001 of an example, case1 is E-object by the event. case 2 and 3 performs only renewal of a mapping definition for updating and renewal of a mapping definition. The example of description of this scenario is shown in the scenario definition 1002. It is shown by an I/O definition and the mapping definition 1003 in this scenario definition. E-object The input definition 1004 and R-object A type definition 1005, the attribute mapping definition 1006, and the method operational definition 1007 can be described and called into a flow. In addition, an I/O definition and the mapping definition 1003 use the notation shown by drawing 9 , and can do the group definition which carried out grouping of two or more definitions.

[0043] Drawing 12 is drawing showing the configuration of the GUI I/O means in the database information visualization AP development support system of this invention.

[0044] The GUI I/O means 1101 consists of the GUI transfer signal transduction 1102, GUI transfer signal transduction definition 1103, object scenario registration 1104, and event message reception 1105. If a GUI transfer signal transduction demand is described in scenario execute form, the GUI transfer signal transduction 1102 of the GUI information I/O means 1101 will make the reception translation of the demand, and will generate the information transmitted to GUI which corresponds using the GUI transfer signal transduction definition 1103. The information is C-object by the object scenario registration 1104. Or D-object It is registered. On the other hand, it is notified to the event message reception 1105 of the GUI I/O means 1101, and the event by the mouse and key stroke by the side of GUI is R-object from the object actuation communications control section. Method actuation is performed.

[0045] Drawing 13 - drawing 15 are drawings showing the example of a charge screen of interactive I/O definition / mapping definition in the database information visualization AP

development support system of this invention. Drawing 13 (a) shows an I/O schema definition screen, and drawing 13 (b) shows an input-output-conversion information definition screen. When an input side inputs DB-NAME and TABLE-NAME, a schema retrieval result is displayed automatically. An input-output-conversion information definition is set up by cut & paste from an I/O definition screen. By input-output-conversion script definition, it is the input output conversion operation of drawing 14 (b). A selection dialog to conversion operation It can choose. E-object R-object The mapping definition of a mold (a node mold, line mold) can be assigned only by checking the check carbon button of LINE of the object mold mapping definition screen of drawing 14 (a), or NODE. R-object The mapping definition of selection and the reference attribute of a display attribute generation method, and a stereo attribute is R-object of drawing 15 (a). It can carry out from a reference attribute mapping definition screen. A selectable menu is displayed and an object object, a selection method, and a mapping attribute can be easily chosen, if the mouse click of the applicable part is carried out. It is displayed that the stereo attribute selection dialog of drawing 15 (b) clicks the item (R#) which wants to map a reference attribute subject name.

[0046] Drawing 16 is drawing showing the example of representation of the object arrangement method of the object arrangement coordinate generation processing in the database information visualization AP development support system of this invention. The pattern 1 (1301) with which a pattern opts for node arrangement based on the related information between stereos, The pattern 2 (1302) which arranges a node on a node arrangement line based on the specified information, and arranges a point node / transit node always on a node passage line from the ends information on a line, The subnode included by the node on node arrangement area in a node is arranged on a node based on the specified information. The relative position of a node is determined from the pattern 3 (1303) which connects between subnodes from the always point information on a line, and two specified attributes, and four kinds of the patterns 4 (1304) which extract a related node from the subline which constitutes a line, and arrange a line are shown as an example.

[0047] Drawing 17 is drawing showing the example of the variation of the visualization pattern which changes the above-mentioned mapping definition and the definition of an object actuation method activity, and is obtained. initial pattern drawing (1401) was set up first — assuming — an object type (a node —) Object type modification pattern drawing obtained by changing a line (1402), Node arrangement information source modification pattern drawing which changes the information source of node arrangement and is obtained (1403), Line layout method modification pattern drawing which changes the configuration method of a line and is obtained (1404), The variation of an expression as shown in the node arranging method modification pattern drawing (1405) which changes the configuration method of a node and is obtained, and coordinate attribute addition pattern drawing (1406) which applies a coordinate attribute (Z-axis) to the information source of node arrangement, and is obtained by the three dimension becomes possible [choosing variously]. The above-mentioned variation is chosen according to the point which a user wants to note.

[0048] As mentioned above, the database information visualization AP development support system of this invention (a) The schema definition of the database of an input side, and the schema definition of the display stereo of an output side, And a means to generate the set of the method in connection with database retrieval and edit of a retrieval result from the mapping description script during both schemas definition, (b) The user description about the following definitions related to what kind of graphic form expresses a display stereo is translated. The definition about mapping between a means to transmit a message to the object of relevance, and (1) display stereo and a screen object mold, (2) The definition about the attribute information on the display stereo used for attribute information generation by the method about the attribute information generation about the configuration of a screen object, and its method, (3) The definition about the attribute information on the display stereo used for arrangement coordinate transformation by the method about the arrangement coordinate transformation about arrangement of a screen object, and its method, (c) The user description about the scenario definition about in which sequence the definition about the graphical representation shown by

the above-mentioned (b) is performed when is translated. Offer of a means to register as the object of relevance or a method of a menu, and the input screen which can input interactively the definition of (b) of (d) above and (c), and the inputted information are translated. By transmitting a message to the object of relevance, or defining in advance the definition of a means to register as the object of relevance, or a method of a menu and (b), and (c) with a description language, and registering as AP The information about the means which can carry out repeat activation, and the display created by (e) above is changed according to the GUI tool which the user chose, and it has a means to transmit the information to GUI.

[0049] And in the database information visualization AP development support system of this invention, it can develop simply, without describing the detailed logic of graphic form information generation, when a user describes a mapping definition concerning graphic form information generation in visualization AP for general alphabetic character and numerical information accumulated in a database, and the scenario definition about an execution sequence by the graphical representation of the screen object of a node mold or a line mold. Furthermore, making the information unit of arbitration corresponding to a screen object from a database and a screen object can be made to output to the GUI tool of arbitration by I/O definition of a user.

[0050]

[Effect of the Invention] As explained above, according to this invention, it becomes possible to extract selectively an information unit suitable from the database which accumulates an alphabetic character and numerical information only by a user describing a schema definition and conversion script of I/O, and to display it as a screen object on an indicating equipment. Moreover, it only defines with which object mold of a line mold or a node mold a user expresses the selected information unit, using which attribute he decides in object arrangement or an object configuration, or which arrangement method is selectively operated to an event response, and the various visualization expressions which combined two or more physical relationship between the screen objects and objects of a node mold and a line mold are attained. Moreover, if the GUI tool to display carries out the signal transduction definition for formal conversion of a display attribute for every GUI tool, the selection of a GUI tool of it will also be attained at scenario description.

[0051] Thus, in the database information visualization AP development support system of this invention, the information on the database of an alphabetic character and a numeric value can be expressed by the object of a node and a line, and AP which generates various expression patterns using the attribute can be simply developed by easy scenario description or interactive information definition.

[0052] Moreover, according to this invention, in the case of the display attribute generation method which determines configurations, such as a form of a screen object, a color, and magnitude, a user specifies the attribute information on the display stereo used for the display attribute generation method which a system prepares, and it. When this attribute information is numerical information, a display attribute is generated only by specifying assignment of ascending order or descending order, and the width of face of a value, and specifying assignment of user conversion-table assignment, an alphabetical order, or the order of an internal code of text, and a conversion-table name as a parameter at the time of text. Thus, without only specifying a parameter required for the attribute information on a display stereo and the display information generation method which are referred to by the display information generation method and display information generation, and describing the detailed algorithm about generation of a display attribute, a user can generate a display attribute and is effective in the ability to display a screen object automatically.

[0053] Furthermore, according to this invention, in the display information generation which determines the arrangement coordinate of a screen object, a user specifies the attribute information on the display stereo referred to by the arrangement coordinate transformation method which a system prepares, and its method.

[0054] The three-dimension coordinate transformation method which uses (a)3 ** attribute information as a coordinate transformation method to the object of a node mold, (b) The-like-proportionally coordinate transformation method which assigns attribute information

proportionally to a display coordinate-like, (c) The relative coordinate transformation method relatively assigned so that duplication of a node may not occur on the coordinate of an operating space based on attribute information, (d) The attribute information on the display stereo referred to by these conversion methods is defined as assignment of coordinate transformation methods, such as an allocation-coordinate transformation method assigned to the viewing area defined using attribute information, and an ordinal-type coordinate transformation method arranged according to the sequence of the value of (e) attribute information.

[0055] The linear line coordinate transformation method which connects between nodes in a straight line as a coordinate transformation method to the object of a line mold, So that duplication of two or more line mold objects which connect between nodes may be eliminated the always point on a node The indirect line coordinate transformation method chosen and displayed on a node from the node beforehand prepared on the diagonal line, The intensive line coordinate transformation method which collects two or more line mold object between nodes, and is displayed by the one line mold object, When a line mold object passes a node mold object, and displaying on a node mold object and carrying out termination by the node mold object The attribute information on the display stereo referred to by these conversion methods is defined as assignment of coordinate transformation methods, such as a passage mold line coordinate transformation method displayed on the bottom of a node mold object.

[0056] Thus, without only specifying a parameter required for the attribute information and the conversion method of a display stereo which are referred to by the coordinate transformation method and the method, and describing the algorithm about generation of display attribute information, a user can generate a display attribute and is effective in the ability to display a screen object automatically.

[0057] Moreover, according to this invention, the effectiveness that easy-izing of functional verification of AP creation time, short-time-izing, easy-izing of AP creation after a functional check, and short-time-ization can attain is by making possible the mode which registers various kinds of assignment about the display information generation by the user in advance by the mode which can be specified from the screen of a display by the interactive mode, and scenario description of a text file format, and can be performed.

[0058] Furthermore, according to this invention, it is effective in enabling description of changing selection of the display stereo from a database, and the graphical representation of a display stereo into an event response, and enabling modification of continuous graphical representation, and modification of the graphical representation of an event response by defining various kinds of assignment about the display information generation by the user during state-transition description of the event of AP.

[0059] Moreover, according to this invention, independently of a variety of GUI tools, the generation and conversion from a display stereo to the information on a display information object are possible, and it is effective in the escape to various GUI being easy by adding the signal transduction from a display information object to a screen object to a GUI tool response.

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TECHNICAL FIELD

[Industrial Application] This invention maps the information on the alphabetic character accumulated in a database, or a numeric value in the object of the node mold on a screen, and the object of a line mold, and relates configurations, such as a form of each object, a color, and magnitude, and an arrangement coordinate to the database information visualization AP development support system which supports generation and the development of information visualization AP to display using the attribute information on a database.

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PRIOR ART

[Description of the Prior Art] In the system which carries out the visualization of the information on the conventional DB (database) (1) The table output of the alphabetic character and the numerical information of the table image of a relational database can be simply carried out in menu manipulation with text. The database front system which can also customize a screen, the system which can display the numeric data on (2) relational databases or a spreadsheet as a graph of various patterns by menu manipulation, (3) Color display of the numerical information, such as measurement results, such as a statistics processing software package, spreadsheet software, and earth environment, is carried out at many dimensions. By various information filtering processings, the numeric data visualization system which can be analyzed many-sided, (4) Nodes and line objects, such as a communication network and a network of railroads, are stuck on a map. Transform the color of an object etc. according to the condition of the object in the real world, or There are a network information management tool which expands the selected field, or chooses an object and displays the content of a detail, a graphical representation tool which can choose the style corresponding to the expression pattern based on (5) graph algorithm.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to this invention, it becomes possible to extract selectively an information unit suitable from the database which accumulates an alphabetic character and numerical information only by a user describing a schema definition and conversion script of I/O, and to display it as a screen object on an indicating equipment. Moreover, it only defines with which object mold of a line mold or a node mold a user expresses the selected information unit, using which attribute he decides in object arrangement or an object configuration, or which arrangement method is selectively operated to an event response, and the various visualization expressions which combined two or more physical relationship between the screen objects and objects of a node mold and a line mold are attained. Moreover, if the GUI tool to display carries out the signal transduction definition for formal conversion of a display attribute for every GUI tool, the selection of a GUI tool of it will also be attained at scenario description.

[0051] Thus, in the database information visualization AP development support system of this invention, the information on the database of an alphabetic character and a numeric value can be expressed by the object of a node and a line, and AP which generates various expression patterns using the attribute can be simply developed by easy scenario description or interactive information definition.

[0052] Moreover, according to this invention, in the case of the display attribute generation method which determines configurations, such as a form of a screen object, a color, and magnitude, a user specifies the attribute information on the display stereo used for the display attribute generation method which a system prepares, and it. When this attribute information is numerical information, a display attribute is generated only by specifying assignment of ascending order or descending order, and the width of face of a value, and specifying assignment of user conversion-table assignment, an alphabetical order, or the order of an internal code of text, and a conversion-table name as a parameter at the time of text. Thus, without only specifying a parameter required for the attribute information on a display stereo and the display information generation method which are referred to by the display information generation method and display information generation, and describing the detailed algorithm about generation of a display attribute, a user can generate a display attribute and is effective in the ability to display a screen object automatically.

[0053] Furthermore, according to this invention, in the display information generation which determines the arrangement coordinate of a screen object, a user specifies the attribute information on the display stereo referred to by the arrangement coordinate transformation method which a system prepares, and its method.

[0054] The relative coordinate transformation method and (d) attribute information which are relatively assigned as a coordinate transformation method to the object of a node mold so that duplication of a node may not occur on the coordinate of an operating space based on the three-dimension coordinate transformation method which uses (a)3 ** attribute information, the-like-proportionally coordinate transformation method which assigns (b) attribute information proportionally to a display coordinate-like, and (c) attribute information The attribute information on the display stereo referred to by these conversion methods is defined as assignment of

coordinate transformation methods, such as an allocation-coordinate transformation method assigned to the defined viewing area and an ordinal-type coordinate transformation method arranged according to the sequence of the value of (e) attribute information.

[0055] To the object of a line mold, duplication of two or more line mold objects which connect between the linear line coordinate transformation method which connects between nodes in a straight line as a coordinate transformation method, and a node is eliminated. The indirect line coordinate transformation method which chooses and displays the always point on a node on a node from the node beforehand prepared on the diagonal line, The intensive line coordinate transformation method which collects two or more line mold object between nodes, and is displayed by the one line mold object, When a line mold object passes a node mold object, and displaying on a node mold object and carrying out termination by the node mold object The attribute information on the display stereo referred to by these conversion methods is defined as assignment of coordinate transformation methods, such as a passage mold line coordinate transformation method displayed on the bottom of a node mold object.

[0056] Thus, without only specifying a parameter required for the attribute information and the conversion method of a display stereo which are referred to by the coordinate transformation method and the method, and describing the algorithm about generation of display attribute information, a user can generate a display attribute and is effective in the ability to display a screen object automatically.

[0057] Moreover, according to this invention, the effectiveness that easy-izing of functional verification of AP creation time, short-time-izing, easy-izing of AP creation after a functional check, and short-time-ization can attain is by making possible the mode which registers various kinds of assignment about the display information generation by the user in advance by the mode which can be specified from the screen of a display by the interactive mode, and scenario description of a text file format, and can be performed.

[0058] Furthermore, according to this invention, it is effective in enabling description of changing selection of the display stereo from a database, and the graphical representation of a display stereo into an event response, and enabling modification of continuous graphical representation, and modification of the graphical representation of an event response by defining various kinds of assignment about the display information generation by the user during state-transition description of the event of AP.

[0059] Moreover, according to this invention, independently of a variety of GUI tools, the generation and conversion from a display stereo to the information on a display information object are possible, and it is effective in the escape to various GUI being easy by adding the signal transduction from a display information object to a screen object to a GUI tool response.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the display stereo which is the information unit of arbitration is chosen from the alphabetic character and numerical information in a database. Map this display stereo in the object of a node mold or a line mold, and it is expressed a graphic form table. Information visualization AP which can generate the information about the configuration of the object, or arrangement based on the attribute of object information The environment where information visualization AP can be realized only by a user specifying the parameter of the attribute information which an attribute information generation method and a method refer to with the interactive mode or a prior registration mold, and a method does not have the conventional example.
[0004] The 1st object of this invention is to offer the database information visualization AP development support system with which a user can describe simply the information-unit (display stereo) definition of the graphical representation extracted from the information accumulated in DB.
[0005] The mapping definition related to with what kind of graphic form the 2nd object of this invention expresses a display stereo, Namely, the definition about mapping between (1) display stereo and a screen object mold, (2) The definition about the attribute information on the display stereo used for attribute information generation by the method about the attribute information generation about the configuration of a screen object, and its method, (3) It is in offering the database information visualization AP development support system with which a user can describe the definition about the attribute information on the display stereo used for arrangement coordinate transformation by the method about the arrangement coordinate transformation about arrangement of a screen object, and its method.
[0006] The 3rd object of this invention is to offer the database information visualization AP development support system with which a user can describe the scenario definition about in which sequence the definition about the graphical representation shown for said 2nd object is performed when.
[0007] The 4th object of this invention is to offer the database information visualization AP development support system with which a user can define the definition shown for said 2nd and 3rd object in both the modes of the interactive mode and a prior definition mold.
[0008] The 5th object of this invention is to offer the database information visualization AP development support system with which a user can choose the GUI (Graphical User Interface) tool to display.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, the database information visualization AP development support system of this invention The display stereo which is the information unit of arbitration is chosen from the alphabetic character and numerical information accumulated in a database. By creating the attribute information about the configuration of a screen object required for a visualization, or arrangement using the attribute information on this display stereo, and mapping the information in the screen object of the GUI tool of an indicating equipment In the development support system of visualization AP which carries out graphical representation of the display stereo by the object of a graph node mold and a line mold A means to input a display stereo from a database, and screen object type selection, and a configuration and the mapping definition means about the attribute information generation about arrangement, Let it be a summary to have the scenario definition means of the activation opportunity of a mapping definition, or sequence, interactive definition / activation means of a mapping definition or a scenario definition, and a prior registration type definition and an activation means, and the selection means of the GUI tool for I/O.
[0010] Moreover, the database information visualization AP development support system of this invention carries out having had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input, or a screen by making schema definition of the database of an input side, schema definition of the display stereo of an output side, and mapping during both schemas definition into a script as a summary in said display stereo input means, when choosing a display stereo from the alphabetic character and the numerical information accumulated in a database.
[0011] Furthermore, the database information visualization AP development support system of this invention In said display stereo input means, when carrying out graphical representation of an alphabetic character and the numerical information, the selected display stereo The screen object which is an object of the node mold which expresses with the rectangle on the screen of an indicating equipment, a cube, etc., Or it realizes by making it correspond to one of the screen objects of the screen object of the line mold expressed with the chain of a straight line and a straight line etc. Let it be a summary to have had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input, or a screen by making mapping of the node mold of this display stereo and a screen object, or a line mold into a script.
[0012] The database information visualization AP development support system of this invention carries out having had one of means at least among the means which carry out a selection input as a parameter on the means which carries out a description input , or a screen as a summary in said display stereo input means by making into a script mapping of the information which the display attribute generation method for display attribute generation and this method use for display attribute generation , when generating the display attribute which is the attribute information about the configuration of a screen object , or arrangement .
[0013] Moreover, in the scenario definition means of the activation opportunity of said mapping definition, or sequence, the database information visualization AP development support system of this invention makes it a summary to have had the means which carries out the description

input of the activation opportunity of the macro definition of the execution sequence of said mapping definition, and macro definition as a scenario, when a prior registration type definition and an activation means describe AP.

[0014] Furthermore, in the selection means of said GUI tool for I/O, the database information visualization AP development support system of this invention defines the generated display information by user assignment as a standard display information object independent of the GUI tool of a proper, and makes it a summary to perform two steps of signal transduction of a display stereo, a display information object and a display information object, and a screen object.

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OPERATION

[Function] With the database information visualization AP development support system of this invention The display stereo input means from a database, and screen object type selection, and a configuration and the mapping definition means about the attribute information generation about arrangement, Information visualization AP can be simply developed with the scenario definition means of the activation opportunity of a mapping definition, or sequence, the interactive ruler and activation means of this mapping definition means and a scenario definition means, and a prior registration type definition and an activation means, and the selection means of the GUI tool for I/O.
[0016] Moreover, in the database information visualization AP development support system of this invention, when choosing a display stereo from the alphabetic character and numerical information accumulated in DB in said display stereo input means, by making schema definition of the database of an input side, schema definition of the display stereo of an output side, and mapping during both schemas definition into a script, a description input is carried out or a selection input is carried out as a parameter on a screen.
[0017] Furthermore, it realizes by making it correspond to one of the screen objects of the screen object which is an object of a node mold, or the screen object of a line mold, and when carrying out graphical representation of an alphabetic character and the numerical information in said display stereo input means, the selected display stereo carries out a description input, or carries out a selection input as a parameter on a screen in the database information visualization AP development support system of this invention by making mapping of the node mold of this display stereo and a screen object, or a line mold into a script.
[0018] When generating a display attribute in said display stereo input means, in the database information visualization AP development support system of this invention, by making into a script mapping of the information which the display attribute generation method for display attribute generation and this method use for display attribute generation, a description input is carried out or a selection input is carried out as a parameter on a screen.
[0019] Moreover, in the database information visualization AP development support system of this invention, when a prior registration type definition and an activation means describe AP in the scenario definition means of the activation opportunity of said mapping definition, or sequence, a description input is carried out, using the activation opportunity of the macro definition of the execution sequence of a mapping definition, and macro definition as a scenario.
[0020] Furthermore, the database information visualization AP development support system of this invention defines the generated display information by user assignment as a standard display information object independent of the GUI tool of a proper in the selection means of said GUI tool for I/O, and two steps of signal transduction of a display stereo, a display information object and a display information object, and a screen object is performed with it.

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EXAMPLE

[Example] The example of this invention is explained using a drawing. Drawing 1 is the block diagram showing the configuration of the database information visualization AP development support system concerning one example of this invention. The database information visualization AP development support system shown in this drawing The information source DB101, the display stereo input means 102, the display information DB103, the GUI (Graphical User Interface) I/O means 104, GUI equipment 105, an end user 106, the interactive charge means 107, the registration mold charge means 108, The scenario definition translation 109, the input definition translation 110, the mapping definition translation 111, the output definition translation 112, the object actuation communications control 113, the display information generation method 114, E-object 115 (display stereo), and R-object (Display information object) It consists of 116, D-object 117 (screen object), and C-object 118 (control object).
[0022] The information source DB101 is set to DB in which the alphabetic character and numerical information of the structure where he is not specially conscious of the stereo of a display are accumulated. If the display stereo input means 102 is performed according to the execute form 110 outputted by translating an input definition from the information source DB101, E-object 115 will be obtained. R-object 116 is generated using the information on E-object 115 based on the execute form 111 outputted by translating a mapping definition. Furthermore, information (display attribute) required for the display of D-object 117 is created on R-object 116 by the display information generation method 114 operated via the object actuation communications control 113 based on a mapping definition. The display attribute of R-object 116 is transmitted to D-object 117 based on the execute form 112 outputted by translating an output definition.
[0023] AP definition of a user carries out the selection charge of the parameter interactively shown by the dialog, a pop up window, etc. from the exclusive window of a KURAFIKARU screen interface. The file output of the scenario description of the text format created with the graphical GUI tool of the interactive charge means 107 which can display a result immediately, and a general purpose is carried out. This file is registered into C-object 118 and it constitutes from the two modes of a registration mold charge means 108 by which the graphic display which followed the scenario at the time of actuation of C-object 118 is carried out.
[0024] Drawing 2 is drawing showing the configuration of said display stereo input means 102 currently used for the database information visualization AP development support system of drawing 1 (when the information source DB is RDB).
[0025] The input definition of a display stereo consists of interactive input definition 201 and registration blocking force definition 202. In the interactive input definition 201, input schema definition and conversion information definition & conversion script description and an output schema definition are, and these definitions are changed into DB retrieval / object generation sentence file by the input definition translation 203. DB retrieval activation section of the display stereo input means 204 performs, and this DB retrieval sentence file is E-object. It is outputted by file format. Furthermore, an object generation sentence is performed by the object generation activation section of the display stereo input means 204, and it is E-object of file format. E-object of the display information DB It is registered by carrying out.

[0026] On the other hand, during AP scenario description of the registration blocking force definition 202, it is E-object. An input request can be described. It translates by the scenario definition translation 205, and this description is E-object. Detection of an input request requires DB retrieval / object generation sentence file of the input definition translation 203. It is transmitted to the GUI I/O means 206, and registers with C-object 117, and the scenario executable statement generated here is C-object. It performs at the time of actuation and is D-object. It is displayed by carrying out.
[0027] Drawing 3 is drawing showing the I/O schema definition and the example of conversion script description in the database information visualization AP development support system of this invention. A definition required for conversion is the input schema definition 301 of the information source DB, the conversion information definition 302 which is needed for conversion, and E-object. It consists of output schema definitions 303. In the conversion information definition 302, it is E-object. A key information definition and E-object It consists of the related definition between classes, an instance calculation information definition, and an attribute permutation definition. The content of conversion is described by the conversion script 304. The fundamental configuration of a conversion script is defined by the three-stage of attribute retrieval, attribute edit, and object generation.
[0028] Drawing 4 is drawing showing the example of a configuration of conversion script functor. A conversion script is classified into fundamental DB retrieval, object generation, attribute edit, and retrieval (example of communication network information) of a field proper. Functor constitutes from an id number of the definition file referred to with an operator, and other additional information (retrieval conditions etc.).
[0029] Drawing 5 is drawing showing the example of a succession definition of the object class in the database information visualization AP development support system of this invention.
[0030] An object class is D-object built on the screen of the display information DB object class 401 and indicating equipment which are built on the display information DB. It is divided roughly into a class (screen object) 402. E-object which accumulates the information chosen from Existing DB in the display information DB object class 401 A class (stereo object) 403 and E-object R-object mapped A class (display information object) 404 and C-object which registers a scenario It is succeeded by the class (control object) 405. A display object class is inherited by the line mold object class 407 expressed with the chain of the node mold object class 406 expressed with a rectangle, a circle, a cube, etc. on GUI, a straight line, and a straight line etc. A screen object class is inherited by each GUI product object class 408 corresponding to a product.
[0031] Drawing 6 is drawing showing the example of the attribute and method definition of the object class in the database information visualization AP development support system of this invention.
[0032] the example of the attribute and method defined as the lowest class as a result of object succession — E-object The attribute and the method definition 501 of a class, and R-object The attribute and the method definition 502 of the node mold object class which is a low order class of a class, the attribute and method definition 503 of the line mold object class which is a low order class of a R-object class, and C-object the attribute and the method definition 504 of a class — it is shown independently. R-object In the low order class of a class, it is D-object. A display attribute required for a display, the reference attribute which defines mapping which shows the attribute relation which a display information generation method uses, and E-object Various display information generation methods are defined as the stereo attribute which inherited the attribute of a class.
[0033] Drawing 7 is drawing showing the example of a configuration of the mapping definition for the display information generation in the database information visualization AP development support system of this invention.
[0034] The information on E-object 601 is E-object-R-object. It is mapped by R-object 603 of a node mold or a line mold according to the mold mapping definition 602. In R-object 603, it is E-object. The stereo attribute 604 and D-object by which the attribute was mapped It consists of a display attribute 605 which is transmitted and is used for a display, and a reference attribute

606 which shows the stereo attribute which a display attribute generation method refers to. If it is decided fixed using which reference attribute signal transduction of each display attribute generation method is carried out and a user describes mapping of a stereo attribute and a reference attribute, a method will generate a display attribute using the mapped stereo attribute. Mapping to the reference attribute of this stereo attribute is D-object. The method about a configuration, the mapping definition 607, and D-object It constitutes from the method and the mapping definition 608 about arrangement.

[0035] Drawing 8 is drawing showing the configuration of the translation and execution control of the mapping definition in the database information visualization AP development support system of this invention.

[0036] It is defined as the interactive mapping definition 701 a definition result is immediately [whose] performed with a graphical interface as a part of scenario with a text file interface, and a mapping definition is C-object. It constitutes from registration mold mapping definition 702 performed after registration. The object actuation communications control section 704 transmits the object actuation message generated by the mapping definition translation 703 to each object, and an interactive mapping definition is performed immediately. On the other hand, the scenario definition translation 705 translates the various mapping definitions where the registration mold mapping definition was embedded into the scenario, and, as for a mapping definition, a translation and the output of an object actuation message are requested from the mapping definition translation 703. The scenario execute form which combined the scenario and the object actuation message is C-object on GUI equipment by the GUI I/O means 706. Or D-object It is generated and registered. This mapping definition is C-object by a user's menu manipulation. Or D-object When operated, the object actuation communications control section is started and performed.

[0037] Drawing 9 is drawing showing the example of mapping definition description of the registration mold in the database information visualization AP development support system of this invention.

[0038] Mapping definition description is E-object. R-object mapped The object mold allocation definition 801 and R-object which define a mold (a node mold, line mold) It consists of reference attribute pointer setting-out definition 802 which defines the stereo attribute which a reference attribute shows, and a method operational definition 803 which defines the class of display information generation method to be used.

[0039] Drawing 10 is drawing showing the example of description of the parameter definition to which setting out is needed for an actuation method proper in connection with the method operational definition of drawing 9 in the database information visualization AP development support system of this invention.

[0040] In the example 901 of a parameter definition over the actuation method of object configurations, such as deciding the color of an object with the value of a stereo attribute, the mapping approach of the value of a stereo attribute and a color is minced with numeric data at order type, and it is cut value about width of face. color definition defines the sequence of the color mapped. In order type, it can specify "ascending order / descending order / alphabetical order / the order of an internal code / refer to the conversion table", etc. The maximum coordinate to arrange can be specified in the example 902 of a parameter definition over the actuation method of object arrangement, such as deciding the arrangement coordinate of an object with the value of a stereo attribute.

[0041] Drawing 11 is drawing showing the example of user scenario processing description of the registration mold in the database information visualization AP development support system of this invention.

[0042] Setting to drawing 11 , for the scenario processing flow 1001 of an example, case1 is E-object by the event. case 2 and 3 performs only renewal of a mapping definition for updating and renewal of a mapping definition. The example of description of this scenario is shown in the scenario definition 1002. It is shown by an I/O definition and the mapping definition 1003 in this scenario definition. E-object The input definition 1004 and R-object A type definition 1005, the attribute mapping definition 1006, and the method operational definition 1007 can be described

and called into a flow. In addition, an I/O definition and the mapping definition 1003 use the notation shown by drawing 9 , and can do the group definition which carried out grouping of two or more definitions.

[0043] Drawing 12 is drawing showing the configuration of the GUI I/O means in the database information visualization AP development support system of this invention.

[0044] The GUI I/O means 1101 consists of the GUI transfer signal transduction 1102, GUI transfer signal transduction definition 1103, object scenario registration 1104, and event message reception 1105. If a GUI transfer signal transduction demand is described in scenario execute form, the GUI transfer signal transduction 1102 of the GUI information I/O means 1101 will make the reception translation of the demand, and will generate the information transmitted to GUI which corresponds using the GUI transfer signal transduction definition 1103. The information is C-object by the object scenario registration 1104. Or D-object It is registered. On the other hand, it is notified to the event message reception 1105 of the GUI I/O means 1101, and the event by the mouse and key stroke by the side of GUI is R-object from the object actuation communications control section. Method actuation is performed.

[0045] Drawing 13 - drawing 15 are drawings showing the example of a charge screen of interactive I/O definition / mapping definition in the database information visualization AP development support system of this invention. Drawing 13 (a) shows an I/O schema definition screen, and drawing 13 (b) shows an input-output-conversion information definition screen. When an input side inputs DB-NAME and TABLE-NAME, a schema retrieval result is displayed automatically. An input-output-conversion information definition is set up by cut & paste from an I/O definition screen. By input-output-conversion script definition, it is the input output conversion operation of drawing 14 (b). A selection dialog to conversion operation It can choose. E-object R-object The mapping definition of a mold (a node mold, line mold) can be assigned only by checking the check carbon button of LINE of the object mold mapping definition screen of drawing 14 (a), or NODE. R-object The mapping definition of selection and the reference attribute of a display attribute generation method, and a stereo attribute is R-object of drawing 15 (a). It can carry out from a reference attribute mapping definition screen. A selectable menu is displayed and an object object, a selection method, and a mapping attribute can be easily chosen, if the mouse click of the applicable part is carried out. It is displayed that the stereo attribute selection dialog of drawing 15 (b) clicks the item (R#) which wants to map a reference attribute subject name.

[0046] Drawing 16 is drawing showing the example of representation of the object arrangement method of the object arrangement coordinate generation processing in the database information visualization AP development support system of this invention. The pattern 1 (1301) with which a pattern opts for node arrangement based on the related information between stereos, The pattern 2 (1302) which arranges a node on a node arrangement line based on the specified information, and arranges a point node / transit node always on a node passage line from the ends information on a line, The subnode included by the node on node arrangement area in a node is arranged on a node based on the specified information. The relative position of a node is determined from the pattern 3 (1303) which connects between subnodes from the always point information on a line, and two specified attributes, and four kinds of the patterns 4 (1304) which extract a related node from the subline which constitutes a line, and arrange a line are shown as an example.

[0047] Drawing 17 is drawing showing the example of the variation of the visualization pattern which changes the above-mentioned mapping definition and the definition of an object actuation method activity, and is obtained. initial pattern drawing (1401) was set up first — assuming — an object type (a node —) Object type modification pattern drawing obtained by changing a line (1402), Node arrangement information source modification pattern drawing which changes the information source of node arrangement and is obtained (1403), Line layout method modification pattern drawing which changes the configuration method of a line and is obtained (1404), The variation of an expression as shown in the node arranging method modification pattern drawing (1405) which changes the configuration method of a node and is obtained, and coordinate attribute addition pattern drawing (1406) which applies a coordinate attribute (Z-axis) to the

information source of node arrangement, and is obtained by the three dimension becomes possible [choosing variously]. The above-mentioned variation is chosen according to the point which a user wants to note.

[0048] As mentioned above, the database information visualization AP development support system of this invention (a) The schema definition of the database of an input side, and the schema definition of the display stereo of an output side, And a means to generate the set of the method in connection with database retrieval and edit of a retrieval result from the mapping description script during both schemas definition, (b) The user description about the following definitions related to what kind of graphic form expresses a display stereo is translated. The definition about mapping between a means to transmit a message to the object of relevance, and (1) display stereo and a screen object mold, (2) The definition about the attribute information on the display stereo used for attribute information generation by the method about the attribute information generation about the configuration of a screen object, and its method, (3) The definition about the attribute information on the display stereo used for arrangement coordinate transformation by the method about the arrangement coordinate transformation about arrangement of a screen object, and its method, (c) The user description about the scenario definition about in which sequence the definition about the graphical representation shown by the above-mentioned (b) is performed when is translated. Offer of a means to register as the object of relevance or a method of a menu, and the input screen which can input interactively the definition of (b) of (d) above and (c), and the inputted information are translated. By transmitting a message to the object of relevance, or defining in advance the definition of a means to register as the object of relevance, or a method of a menu and (b), and (c) with a description language, and registering as AP The information about the means which can carry out repeat activation, and the display created by (e) above is changed according to the GUI tool which the user chose, and it has a means to transmit the information to GUI.

[0049] And in the database information visualization AP development support system of this invention, it can develop simply, without describing the detailed logic of graphic form information generation, when a user describes a mapping definition concerning graphic form information generation in visualization AP for general alphabetic character and numerical information accumulated in a database, and the scenario definition about an execution sequence by the graphical representation of the screen object of a node mold or a line mold. Furthermore, making the information unit of arbitration corresponding to a screen object from a database and a screen object can be made to output to the GUI tool of arbitration by I/O definition of a user.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of the database information visualization AP development support system concerning one example of this invention.
[Drawing 2] It is drawing showing the configuration of the display stereo input means currently used for the database information visualization AP development support system of drawing 1 (when the information source DB is RDB).
[Drawing 3] It is drawing showing the I/O schema definition and the example of conversion script description in the database information visualization AP development support system of this invention.
[Drawing 4] It is drawing showing the example of a configuration of the conversion script functor in the database information visualization AP development support system of this invention.
[Drawing 5] It is drawing showing the example of a succession definition of the object class in the database information visualization AP development support system of this invention.
[Drawing 6] It is drawing showing the example of the attribute and method definition of the object class in the database information visualization AP development support system of this invention.
[Drawing 7] It is drawing showing the example of a configuration of the mapping definition for the display information generation in the database information visualization AP development support system of this invention.
[Drawing 8] It is drawing showing the configuration of the translation and execution control of the mapping definition in the database information visualization AP development support system of this invention.
[Drawing 9] It is drawing showing the example of mapping definition description of the registration mold in the database information visualization AP development support system of this invention.
[Drawing 10] It is drawing showing the example of description of a parameter definition of an actuation method in the database information visualization AP development support system of this invention.
[Drawing 11] It is drawing showing the example of user scenario processing description of the registration mold in the database information visualization AP development support system of this invention.
[Drawing 12] It is drawing showing the configuration of the GUI I/O means in the database information visualization AP development support system of this invention.
[Drawing 13] It is drawing showing an I/O schema definition screen and an input-output-conversion information definition screen among the examples of a charge screen of interactive I/O definition / mapping definition in the database information visualization AP development support system of this invention.
[Drawing 14] The object mold mapping definition among the examples of a charge screen of interactive I/O definition / mapping definition in the database information visualization AP development support system of this invention, and input output conversion operation It is drawing showing a selection dialog.

[Drawing 15] R-object among the examples of a charge screen of interactive I/O definition / mapping definition in the database information visualization AP development support system of this invention It is drawing showing a reference attribute mapping definition screen and a stereo attribute selection dialog.
[Drawing 16] It is drawing showing the example of representation of the object arrangement method of the object arrangement coordinate generation processing in the database information visualization AP development support system of this invention.
[Drawing 17] It is drawing showing the example of the variation of the visualization pattern which changes a mapping definition and the definition of an object actuation method activity, and is obtained.
[Description of Notations]
101 Information Source DB
102 Display Stereo Input Means
103 Display Information DB
104 GUI I/O Means
105 GUI Equipment
106 End User
107 Interactive Charge Means
108 Registration Mold Charge Means
109 Scenario Definition Translation
110 Input Definition Translation
111 Mapping Definition Translation
112 Output Definition Translation
113 Object Actuation Communications Control
114 Display Information Generation Method
115 E-object (Display Stereo)
116 R-object (Display Information Object)
117 D-Object (Screen Object)
118 C-object (Control Object)

[Translation done.]

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CORRECTION OR AMENDMENT

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G06F 15/62 320 Z
9/06 530 P
15/40 370 B

[Procedure amendment]
[Filing Date] December 25, Heisei 10
[Procedure amendment 1]
[Document to be Amended] Description
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] In the database information visualization AP development support system which carries out graphical representation of the information on a database based on a definition of a user,
A display stereo input means by which the display stereo which is the information unit of arbitration is inputted from a database, and the schema and value of this display stereo can be changed into arbitration,
A screen object type selection means to choose the graphical representation of a node mold and a line mold,
A configuration and a mapping means to perform the mapping definition about generation of the attribute information on the graphic form about arrangement,
A display information generation means to generate the attribute information on a graphic form according to the mapping definition obtained with this mapping means,
The display stereo inputted with said display stereo input means, and a display information management means to manage the display information object changed by said display information

generation means,
The database information visualization AP development support system characterized by carrying out a screen display of the various graphical representation which combined the node mold graphic form and the line mold graphic form by having an I/O means to perform the graphic display of the definition input from a user, and a conversion result.
[Claim 2] Said display stereo input means characterized by providing the following When choosing a display stereo from the alphabetic character and numerical information accumulated in a database, they are the schema definition of the database of an input side, and the schema definition of the display stereo of an output side. They are one of input means at least among the input means which carry out a selection input as a parameter by making mapping during both schemas definition into a script on the input means which carries out a description input, or a screen.
[Claim 3] In said display stereo input means, when carrying out graphical representation of an alphabetic character and the numerical information, the selected display stereo The screen object which is an object of the node mold which expresses with the rectangle on the screen of an indicating equipment, a cube, etc., Or it realizes by making it correspond to one of the screen objects of the screen object of the line mold expressed with the chain of a straight line and a straight line etc. Mapping of the node mold of this display stereo and a screen object or a line mold is made into a script. The database information visualization AP development support system according to claim 1 characterized by having one of input means at least among the input means which carry out a selection input as a parameter on the input means which carries out a description input, or a screen.
[Claim 4] Said display stereo input means characterized by providing the following When generating the display attribute which is the attribute information about the configuration of a screen object, or arrangement, it is a display attribute generation method for display attribute generation. They are one of input means at least among the input means which carry out a selection input as a parameter on the input means which carries out a description input, or a screen by making into a script mapping of the information which this method uses for display attribute generation.
[Claim 5] The database information visualization AP development support system according to claim 1 characterized by having the input means which carries out the description input of the activation opportunity of the macro definition of the execution sequence of said mapping definition, and macro definition as a scenario in said display information generation means when describing AP.
[Claim 6] The database information visualization AP development support system according to claim 1 characterized by defining the generated display information by user assignment as a standard display information object independent of the GUI tool of a proper, and performing two steps of signal transduction of a display stereo, a display information object and a display information object, and a screen object in said I/O means.
[Procedure amendment 2]
[Document to be Amended] Description
[Item(s) to be Amended] 0001
[Method of Amendment] Modification
[Proposed Amendment]
[0001]
[Industrial Application] This invention maps the information on the alphabetic character accumulated in a database, or a numeric value in the object of the node mold on a screen, and the object of a line mold, and relates configurations, such as a form of each object, a color, and magnitude, and an arrangement coordinate to the database information visualization AP development support system which supports generation and the development of information visualization AP (Application Program) to display using the attribute information on a database.
[Procedure amendment 3]
[Document to be Amended] Description
[Item(s) to be Amended] 0002

[Method of Amendment] Modification
[Proposed Amendment]
[0002]
[Description of the Prior Art] In the system which carries out a visualization, the information on the conventional database (it may only be hereafter written as DB) (1) The table output of the alphabetic character and the numerical information of the table image of a relational database can be simply carried out in menu manipulation with text. The database front system which can also customize a screen, the system which can display the numeric data on (2) relational databases or a spreadsheet as a graph of various patterns by menu manipulation, (3) Color display of the numerical information, such as measurement results, such as a statistics processing software package, spreadsheet software, and earth environment, is carried out at many dimensions. By various information filtering processings, the numeric data visualization system which can be analyzed many-sided, (4) Nodes and line objects, such as a communication network and a network of railroads, are stuck on a map. Transform the color of an object etc. according to the condition of the object in the real world, or There are a network information management tool which expands the selected field, or chooses an object and displays the content of a detail, a graphical representation tool which can choose the style corresponding to the expression pattern based on (5) graph algorithm.
[Procedure amendment 4]
[Document to be Amended] Description
[Item(s) to be Amended] 0008
[Method of Amendment] Modification
[Proposed Amendment]
[0008] The 5th object of this invention is by the user interface of graphics utilization, for example, GUI, (Graphical User Interface) to offer the database information visualization AP development support system with which a user can choose the GUI tool to display.
[Procedure amendment 5]
[Document to be Amended] Description
[Item(s) to be Amended] 0009
[Method of Amendment] Modification
[Proposed Amendment]
[0009]
[Means for Solving the Problem] In order to attain the above-mentioned object, the database information visualization AP development support system of this invention In the database information visualization AP development support system which carries out graphical representation of the information on a database based on a definition of a user A display stereo input means by which the display stereo which is the information unit of arbitration is inputted from a database, and the schema and value of this display stereo can be changed into arbitration, A screen object type selection means to choose the graphical representation of a node mold and a line mold, A configuration and a mapping means to perform the mapping definition about generation of the attribute information on the graphic form about arrangement, A display information generation means to generate the attribute information on a graphic form according to the mapping definition obtained with this mapping means, The display stereo inputted with said display stereo input means, and a display information management means to manage the display information object changed by said display information generation means, Let it be a summary to carry out a screen display of the various graphical representation which combined the node mold graphic form and the line mold graphic form by having an I/O means to perform the graphic display of the definition input from a user, and a conversion result.
[Procedure amendment 6]
[Document to be Amended] Description
[Item(s) to be Amended] 0015
[Method of Amendment] Modification
[Proposed Amendment]
[0015]

[Function] In the database information visualization AP development support system of this invention, in a display stereo input means, the display stereo which is the information unit of arbitration is inputted from a database, the schema and value of this display stereo are changed into arbitration, and the graphical representation of a node mold and a line mold is chosen with a screen object type selection means. Next, the display stereo which generated the attribute information on a graphic form with the display information generation means, and was inputted with said display stereo input means according to the mapping definition about generation of the attribute information on the graphic form about the configuration and arrangement which were obtained with the mapping means and said display information generation means Information visualization AP which carries out a screen display of the various graphical representation which combined the node mold graphic form and the line mold graphic form can be simply developed by managing the changed display information object with a display information management means, and performing the graphic display of the definition input from a user, and a conversion result through an I/O means further.

[Translation done.]

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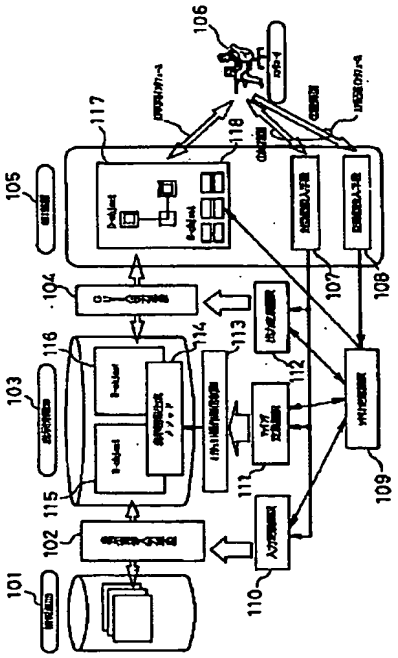
(54)【発明の名称】　データベース情報ビジュアル化ＡＰ開発支援システム

(57)【要約】

【目的】　ＤＢに蓄積される情報から抽出した図形表現の情報単位（表示実体）定義を簡易にユーザが記述できるデータベース情報ビジュアル化ＡＰ開発支援システムを提供する。

【構成】　データベースからの表示実体入力手段１０２と、画面オブジェクトの型選択、形状と配置に関する属性情報生成に関するマッピング定義手段と、マッピング定義の実行契機や順序のシナリオ定義手段と、該マッピング定義手段とシナリオ定義手段の対話型定義・実行手段および事前登録型定義・実行手段と、入出力用ＧＵＩツールの選択手段とにより情報ビジュアル化ＡＰを簡易に開発することができる。



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【特許請求の範囲】

【請求項１】　データベースに蓄積される文字・数値情報から任意の情報単位である表示実体を選択し、該表示実体の属性情報を使用してビジュアル化に必要な画面オブジェクトの形状や配置に関する属性情報を作成し、その情報を表示装置のＧＵＩツールの画面オブジェクトに写像することにより、表示実体をグラフ的なノード型とライン型のオブジェクトで図形表現するビジュアル化ＡＰの開発支援システムにおいて、データベースから表示実体を入力する手段と、画面オブジェクトの型選択、形状と配置に関する属性情報生成に関するマッピング定義手段と、マッピング定義の実行契機や順序のシナリオ定義手段と、マッピング定義やシナリオ定義の対話型定義・実行手段および事前登録型定義・実行手段と、入出力用ＧＵＩツールの選択手段とを備えることを特徴とするデータベース情報ビジュアル化ＡＰ開発支援システム。

【請求項２】　前記システムの表示実体入力手段において、データベースに蓄積される文字・数値情報から表示実体を選択する場合、入力側のデータベースのスキーマ定義と出力側の表示実体のスキーマ定義と、両スキーマ定義間のマッピングをスクリプトとして記述入力する手段または画面上でパラメータとして選択入力する手段のうち少なくともいずれかの手段を備えたことを特徴とする請求項１記載のデータベース情報ビジュアル化ＡＰ開発支援システム。

【請求項３】　前記システムの表示実体入力手段において、文字・数値情報を図形表現する場合、選択された表示実体は、表示装置の画面上の方形、立方体等で表すノード型のオブジェクトである画面オブジェクト、または直線、直線のチェーン等で表現するライン型の画面オブジェクトのどちらかの画面オブジェクトに対応させて実現し、該表示実体と画面オブジェクトのノード型またはライン型のマッピングをスクリプトとして記述入力する手段または画面上でパラメータとして選択入力する手段のうち少なくともいずれかの手段を備えたことを特徴とする請求項１記載のデータベース情報ビジュアル化ＡＰ開発支援システム。

【請求項４】　前記システムの表示実体入力手段において、画面オブジェクトの形状や配置に関する属性情報である表示属性を生成する場合、表示属性生成のための表示属性生成メソッドと、このメソッドが表示属性生成に使用する情報のマッピングをスクリプトとして記述入力する手段または画面上でパラメータとして選択入力する手段のうち少なくともいずれかの手段を備えたことを特徴とする請求項１記載のデータベース情報ビジュアル化ＡＰ開発支援システム。

【請求項５】　前記システムのマッピング定義の実行契機や順序のシナリオ定義手段において、事前登録型定義・実行手段でＡＰを記述する場合、前記マッピング定義の実行順序のマクロ定義、マクロ定義の実行契機を、シナリオとして記述入力する手段を備えたことを特徴とする請求項１記載のデータベース情報ビジュアル化ＡＰ開発支援システム。

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【請求項６】　前記システムの入出力用ＧＵＩツールの選択手段において、ユーザ指定による生成された表示情報を、固有のＧＵＩツールとは独立の標準的な表示情報オブジェクトとして定義し、表示実体と表示情報オブジェクト、表示情報オブジェクトと画面オブジェクトの２段階の情報変換を行うことを特徴とする請求項１記載のデータベース情報ビジュアル化ＡＰ開発支援システム。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、データベースに蓄積される文字や数値の情報を画面上のノード型のオブジェクトとライン型のオブジェクトにマッピングし、各オブジェクトの形、色、大きさ等の形状や、配置座標をデータベースの属性情報を使用して生成・表示する情報ビジュアル化ＡＰの開発を支援するデータベース情報ビジュアル化ＡＰ開発支援システムに関する。

【０００２】

【従来の技術】従来のＤＢ（データベース）の情報をビジュアル化するシステムには、（１）リレーショナルデータベースの表イメージの文字・数値情報を画面操作で簡単に文字情報のまま表出力でき、画面のカスタマイズも可能なデータベースフロントシステム、（２）リレーショナルデータベースやスプレッドシート上の数値データを画面操作により各種パターンのグラフとして表示できるシステム、（３）統計処理パッケージソフトや表計算ソフト、地球環境等の計測結果等の数値情報を多次元でカラー表示し、各種情報フィルタリング処理により多角的分析が可能な数値データビジュアル化システム、（４）地図上に通信網、鉄道網等のノードやラインオブジェクトを張り付けて、実世界のオブジェクトの状態によってオブジェクトの色等を変換させたり、選択した領域を拡大したり、オブジェクトを選択してその詳細内容を表示したりする網情報管理ツール、（５）グラフ理論に基づく表現パターンに対応した表現法が選択できるグラフ表示ツール等がある。

【０００３】

【発明が解決しようとする課題】しかしながら、データベース中の文字・数値情報から任意の情報単位である表示実体を選択し、該表示実体をノード型かライン型のオブジェクトに写像して図形表現し、そのオブジェクトの形状や配置に関する情報を、対象情報の属性を基に生成できるような情報ビジュアル化ＡＰを、ユーザが対話型か事前登録型で属性情報生成メソッドとメソッドが参照する属性情報およびメソッドのパラメータを指定するだけで、情報ビジュアル化ＡＰが実現できるような環境は従来例がない。

【０００４】本発明の第１の目的は、ＤＢに蓄積される

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情報から抽出した図形表現の情報単位（表示実体）定義を簡易にユーザが記述できるデータベース情報ビジュアル化ＡＰ開発支援システムを提供することにある。

【０００５】本発明の第２の目的は、表示実体をどのような図形で表現するかに関係するマッピング定義、すなわち（１）表示実体と画面オブジェクト型間のマッピングに関する定義、（２）画面オブジェクトの形状に関する属性情報生成に関するメソッドとそのメソッドで属性情報生成に使用する表示実体の属性情報に関する定義、（３）画面オブジェクトの配置に関する配置座標変換に関するメソッドとそのメソッドで配置座標変換に使用する表示実体の属性情報に関する定義を、ユーザが記述できるデータベース情報ビジュアル化ＡＰ開発支援システムを提供することにある。

【０００６】本発明の第３の目的は、前記第２の目的で示した図形表現に関する定義を何時、どの順序で実行するかに関するシナリオ定義をユーザが記述できるデータベース情報ビジュアル化ＡＰ開発支援システムを提供することにある。

【０００７】本発明の第４の目的は、前記第２および第３の目的で示した定義を対話型および事前定義型の両モードでユーザが定義できるデータベース情報ビジュアル化ＡＰ開発支援システムを提供することにある。

【０００８】本発明の第５の目的は、表示するＧＵＩ（Graphical User Interface）ツールをユーザが選択できるデータベース情報ビジュアル化ＡＰ開発支援システムを提供することにある。

【０００９】

【課題を解決するための手段】上記目的を達成するため、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、データベースに蓄積される文字・数値情報から任意の情報単位である表示実体を選択し、該表示実体の属性情報を使用してビジュアル化に必要な画面オブジェクトの形状や配置に関する属性情報を作成し、その情報を表示装置のＧＵＩツールの画面オブジェクトに写像することにより、表示実体をグラフ的なノード型とライン型のオブジェクトで図形表現するビジュアル化ＡＰの開発支援システムにおいて、データベースから表示実体を入力する手段と、画面オブジェクトの型選択、形状と配置に関する属性情報生成に関するマッピング定義手段と、マッピング定義の実行契機や順序のシナリオ定義手段と、マッピング定義やシナリオ定義の対話型定義・実行手段および事前登録型定義・実行手段と、入出力用ＧＵＩツールの選択手段とを備えることを要旨とする。

【００１０】また、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、前記表示実体入力手段において、データベースに蓄積される文字・数値情報から表示実体を選択する場合、入力側のデータベースのスキーマ定義と出力側の表示実体のスキーマ定義と、両スキーマ定義間のマッピングをスクリプトとして記述入力する手段または画面上でパラメータとして選択入力する手段のうち少なくともいずれかの手段を備えたことを要旨とする。

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【００１１】更に、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、前記表示実体入力手段において、文字・数値情報を図形表現する場合、選択された表示実体は、表示装置の画面上の方形、立方体等で表すノード型のオブジェクトである画面オブジェクト、または直線、直線のチェーン等で表現するライン型の画面オブジェクトのどちらかの画面オブジェクトに対応させて実現し、該表示実体と画面オブジェクトのノード型またはライン型のマッピングをスクリプトとして記述入力する手段または画面上でパラメータとして選択入力する手段のうち少なくともいずれかの手段を備えたことを要旨とする。

【００１２】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、前記表示実体入力手段において、画面オブジェクトの形状や配置に関する属性情報である表示属性を生成する場合、表示属性生成のための表示属性生成メソッドと、このメソッドが表示属性生成に使用する情報のマッピングをスクリプトとして記述入力する手段または画面上でパラメータとして選択入力する手段のうち少なくともいずれかの手段を備えたことを要旨とする。

【００１３】また、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、前記マッピング定義の実行契機や順序のシナリオ定義手段において、事前登録型定義・実行手段でＡＰを記述する場合、前記マッピング定義の実行順序のマクロ定義、マクロ定義の実行契機を、シナリオとして記述入力する手段を備えたことを要旨とする。

【００１４】更に、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、前記入出力用ＧＵＩツールの選択手段において、ユーザ指定による生成された表示情報を、固有のＧＵＩツールとは独立の標準的な表示情報オブジェクトとして定義し、表示実体と表示情報オブジェクト、表示情報オブジェクトと画面オブジェクトの２段階の情報変換を行うことを要旨とする。

【００１５】

【作用】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムでは、データベースからの表示実体入力手段と、画面オブジェクトの型選択、形状と配置に関する属性情報生成に関するマッピング定義手段と、マッピング定義の実行契機や順序のシナリオ定義手段と、該マッピング定義手段とシナリオ定義手段の対話型定規・実行手段および事前登録型定義・実行手段と、入出力用ＧＵＩツールの選択手段とにより情報ビジュアル化ＡＰを簡易に開発することができる。

【００１６】また、本発明のデータベース情報ビジュア

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ル化ＡＰ開発支援システムでは、前記表示実体入力手段においてＤＢに蓄積される文字・数値情報から表示実体を選択する場合、入力側のデータベースのスキーマ定義と出力側の表示実体のスキーマ定義と、両スキーマ定義間のマッピングをスクリプトとして記述入力するかまたは画面上でパラメータとして選択入力する。

【００１７】更に、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムでは、前記表示実体入力手段において文字・数値情報を図形表現する場合、選択された表示実体は、ノード型のオブジェクトである画面オブジェクトまたはライン型の画面オブジェクトのどちらかの画面オブジェクトに対応させて実現し、該表示実体と画面オブジェクトのノード型またはライン型のマッピングをスクリプトとして記述入力するかまたは画面上でパラメータとして選択入力する。

【００１８】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムでは、前記表示実体入力手段において表示属性を生成する場合、表示属性生成のための表示属性生成メソッドと、このメソッドが表示属性生成に使用する情報のマッピングをスクリプトとして記述入力するかまたは画面上でパラメータとして選択入力する。

【００１９】また、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムでは、前記マッピング定義の実行契機や順序のシナリオ定義手段において事前登録型定義・実行手段でＡＰを記述する場合、マッピング定義の実行順序のマクロ定義、マクロ定義の実行契機をシナリオとして記述入力する。

【００２０】更に、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムでは、前記入出力用ＧＵＩツールの選択手段においてユーザ指定による生成された表示情報を固有のＧＵＩツールとは独立の標準的な表示情報オブジェクトとして定義し、表示実体と表示情報オブジェクト、表示情報オブジェクトと画面オブジェクトの２段階の情報変換を行う。

【００２１】

【実施例】図面を用いて、本発明の実施例を説明する。図１は、本発明の一実施例に係わるデータベース情報ビジュアル化ＡＰ開発支援システムの構成を示すブロック図である。同図に示すデータベース情報ビジュアル化ＡＰ開発支援システムは、情報源ＤＢ１０１、表示実体入力手段１０２、表示情報ＤＢ１０３、ＧＵＩ（Graphical User Interface）入出力手段１０４、ＧＵＩ装置１０５、エンドユーザ１０６、対話型投入手段１０７、登録型投入手段１０８、シナリオ定義翻訳１０９、入力定義翻訳１１０、マッピング定義翻訳１１１、出力定義翻訳１１２、オブジェクト操作通信制御１１３、表示情報生成メソッド１１４、E-object（表示実体）１１５、R-object（表示情報オブジェクト）１１６、D-object（画面オブジェクト）１１７、C-object（制御オブジェクト）１１８から構成される。

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【００２２】情報源ＤＢ１０１は、特別に表示の実体を意識しない構造の文字・数値情報が蓄積されるＤＢとする。情報源ＤＢ１０１から、入力定義を翻訳して出力される実行形式１１０に従って表示実体入力手段１０２を実行すると、E-object １１５が得られる。R-object １１６は、マッピング定義を翻訳して出力される実行形式１１１に基づいて、E-object １１５の情報を使用して生成される。更に、D-object １１７の表示に必要な情報（表示属性）は、マッピング定義に基づいてオブジェクト操作通信制御１１３を経由して操作される表示情報生成メソッド１１４によって、R-object １１６上に作成される。R-object １１６の表示属性は、出力定義を翻訳して出力される実行形式１１２に基づいて、D-object １１７に転送される。

【００２３】ユーザのＡＰ定義は、クラフィカルな画面インタフェースの専用ウィンドウからダイアログやポップアップウィンドウ等で対話的に提示されるパラメータを選択投入し、即時に結果を表示できる対話型投入手段１０７と汎用のグラフィカルなＧＵＩツールで作成したテキスト形式のシナリオ記述をファイル出力し、このファイルをC-object １１８に登録し、C-object １１８の操作時にシナリオに従った図形表示がされる登録型投入手段１０８の２つのモードから構成する。

【００２４】図２は、図１のデータベース情報ビジュアル化ＡＰ開発支援システムに使用されている前記表示実体入力手段１０２の構成（情報源ＤＢがＲＤＢの場合）を示す図である。

【００２５】表示実体の入力定義は、対話型入力定義２０１と登録型入力定義２０２から構成される。対話型入力定義２０１には、入力スキーマ定義、変換情報定義＆変換スクリプト記述、および出力スキーマ定義があり、これらの定義は入力定義翻訳２０３によってＤＢ検索／オブジェクト生成文ファイルに変換される。このＤＢ検索文ファイルは、表示実体入力手段２０４のＤＢ検索実行部によって実行され、E-object がファイル形式で出力される。更に、オブジェクト生成文が、表示実体入力手段２０４のオブジェクト生成実行部によって実行され、ファイル形式のE-object が表示情報ＤＢのE-object として登録される。

【００２６】一方、登録型入力定義２０２のＡＰシナリオ記述中には、E-object 入力要求を記述することができる。この記述は、シナリオ定義翻訳２０５で翻訳され、E-object 入力要求を検出すると、入力定義翻訳２０３にＤＢ検索／オブジェクト生成文ファイルを要求する。ここで生成されたシナリオ実行文は、ＧＵＩ入出力手段２０６に転送されて、C-object １１７に登録され、C-object 操作時に実行され、D-object として表示される。

【００２７】図３は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける入出力スキーマ定

義と変換スクリプト記述例を示す図である。変換に必要な定義は、情報源ＤＢの入力スキーマ定義３０１、変換に必要となる変換情報定義３０２、E-object の出力スキーマ定義３０３から構成される。変換情報定義３０２には、E-object のキー情報定義、E-object クラス間の関係定義、インスタンス算出情報定義、属性置換定義からなる。変換内容は、変換スクリプト３０４で記述される。変換スクリプトの基本的な構成は、属性検索、属性編集、オブジェクト生成の３段階で定義される。

【００２８】図４は、変換スクリプト構文の構成例を示す図である。変換スクリプトは、基本的なＤＢ検索、オブジェクト生成、属性編集、分野固有の検索（通信網情報の例）に分類される。構文はオペレータと参照する定義ファイルのｉｄ番号、その他の付加情報（検索条件等）から構成する。

【００２９】図５は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるオブジェクトクラスの継承定義の例を示す図である。

【００３０】オブジェクトクラスは、表示情報ＤＢ上に構築される表示情報ＤＢオブジェクトクラス４０１と表示装置の画面上に構築されるD-object （画面オブジェクト）クラス４０２に大別される。表示情報ＤＢオブジェクトクラス４０１には、既存ＤＢから選択された情報を蓄積するE-object （実体オブジェクト）クラス４０３と、E-object がマッピングされるR-object クラス（表示情報オブジェクト）４０４と、シナリオを登録するC-object （制御オブジェクト）クラス４０５に継承される。表示オブジェクトクラスは、ＧＵＩ上に方形、円、立方体等で表現するノード型オブジェクトクラス４０６と直線、直線のチェーン等で表現するライン型オブジェクトクラス４０７に継承される。画面オブジェクトクラスは、製品対応の各ＧＵＩ製品オブジェクトクラス４０８に継承される。

【００３１】図６は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるオブジェクトクラスの属性・メソッド定義の例を示す図である。

【００３２】オブジェクト継承の結果、最下位のクラスに定義される属性・メソッドの例を、E-object クラスの属性・メソッド定義５０１、R-object クラスの下位クラスであるノード型オブジェクトクラスの属性・メソッド定義５０２、R-objectクラスの下位クラスであるライン型オブジェクトクラスの属性・メソッド定義５０３、C-object クラスの属性・メソッド定義５０４別に示す。R-object クラスの下位クラスには、D-object の表示に必要な表示属性、表示情報生成メソッドが使用する属性関係を示すマッピングを定義する参照属性、E-object クラスの属性を継承した実体属性と、各種表示情報生成メソッドが定義されている。

【００３３】図７は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける表示情報生成のためのマッピング定義の構成例を示す図である。

【００３４】E-object ６０１の情報は、E-object －R-object 型マッピング定義６０２に従って、ノード型あるいはライン型のR-object ６０３にマッピングされる。R-object ６０３には、E-object の属性がマッピングされた実体属性６０４、D-object に転送されて表示のために使用される表示属性６０５、表示属性生成メソッドが参照する実体属性を示す参照属性６０６から構成される。各表示属性生成メソッドは、どの参照属性を使用して情報変換するかが固定的に決められていて、実体属性と参照属性のマッピングをユーザが記述すると、メソッドはマッピングされた実体属性を使用して表示属性を生成する。この実体属性の参照属性へのマッピングは、D-object の形状に関するメソッドとマッピング定義６０７、D-object の配置に関するメソッドとマッピング定義６０８から構成する。

【００３５】図８は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるマッピング定義の翻訳・実行制御の構成を示す図である。

【００３６】マッピング定義は、グラフィカルなインタフェースで定義結果が即時に実行される対話型マッピング定義７０１と、テキストファイルインタフェースでシナリオの一部として定義し、C-object に登録後実行される登録型マッピング定義７０２から構成する。対話型マッピング定義は、マッピング定義翻訳７０３で生成されるオブジェクト操作メッセージを、オブジェクト操作通信制御部７０４が各オブジェクトに送信して即時に実行される。一方、登録型マッピング定義は、シナリオ中に埋め込まれた各種マッピング定義をシナリオ定義翻訳７０５が翻訳し、マッピング定義は、マッピング定義翻訳７０３に翻訳とオブジェクト操作メッセージの出力を依頼する。シナリオとオブジェクト操作メッセージを結合したシナリオ実行形式は、ＧＵＩ入出力手段７０６によりＧＵＩ装置上のC-object あるいはD-object を生成し、登録される。このマッピング定義は、ユーザの画面操作によりC-object あるいはD-object が操作された時、オブジェクト操作通信制御部が起動されて実行される。

【００３７】図９は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける登録型のマッピング定義記述例を示す図である。

【００３８】マッピング定義記述は、E-object がマッピングされるR-object の型（ノード型、ライン型）を定義するオブジェクト型割当定義８０１、R-object の参照属性が示す実体属性を定義する参照属性ポインター設定定義８０２、使用する表示情報生成メソッドの種類を定義するメソッド操作定義８０３から構成される。

【００３９】図１０は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおいて図９のメソッド操作定義に伴って、操作メソッド固有に設定が必要とな

るパラメータ定義の記述例を示す図である。

【００４０】オブジェクトの色を実体属性の値によって決める等のオブジェクト形状の操作メソッドに対するパラメータ定義例９０１では、実体属性の値と色のマッピング方法をorder typeで、数値データでは刻み幅をcut value で、マッピングされる色の順序をcolor definitionで定義する。order typeでは、昇順／降順／アルファベット順／内部コード順／変換表参照等が指定できる。オブジェクトの配置座標を実体属性の値によって決める等のオブジェクト配置の操作メソッドに対するパラメータ定義例９０２では、配置する最大座標が指定できる。

【００４１】図１１は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける登録型のユーザシナリオ処理記述例を示す図である。

【００４２】図１１において、例題のシナリオ処理フロー１００１は、イベントによって、case１はE-objectの更新とマッピング定義の更新を、case２，３はマッピング定義の更新だけを行う。このシナリオの記述例をシナリオ定義１００２に示す。このシナリオ定義の中では、入出力定義とマッピング定義１００３で示される。E-object 入力定義１００４、R-object 型定義１００５、属性マッピング定義１００６、メソッド操作定義１００７をフロー中に記述して呼び出すことができる。なお、入出力定義とマッピング定義１００３は、図９で示した記述法を使用して、複数の定義をグループ化したグループ定義ができる。

【００４３】図１２は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるＧＵＩ入出力手段の構成を示す図である。

【００４４】ＧＵＩ入出力手段１１０１は、ＧＵＩ転送情報変換１１０２、ＧＵＩ転送情報変換定義１１０３、オブジェクトシナリオ登録１１０４、イベントメッセージ受信１１０５から構成される。シナリオ実行形式中に、ＧＵＩ転送情報変換要求が記述されると、ＧＵＩ情報入出力手段１１０１のＧＵＩ転送情報変換１１０２は、その要求を受信翻訳し、ＧＵＩ転送情報変換定義１１０３を使用して対応するＧＵＩへ転送する情報を生成する。その情報は、オブジェクトシナリオ登録１１０４によってC-object あるいはD-object に登録される。一方、ＧＵＩ側のマウスやキー操作によるイベントは、ＧＵＩ入出力手段１１０１のイベントメッセージ受信１１０５に通知され、オブジェクト操作通信制御部からR-object のメソッド操作が実行される。

【００４５】図１３～図１５は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける対話型の入出力定義・マッピング定義の投入画面例を示す図である。図１３（ａ）は入出力スキーマ定義画面、図１３（ｂ）は入出力変換情報定義画面を示す。入力側は、ＤＢ- ＮＡＭＥとＴＡＢＬＥ- ＮＡＭＥを入力することにより、スキーマ検索結果が自動的に表示される。入出力変換情報定義は、入出力定義画面からのカット＆ペーストで設定する。入出力変換スクリプト定義では、図１４（ｂ）の入出力変換operation 選択ダイアログから変換operation を選択できる。E-object とR-object の型（ノード型、ライン型）のマッピング定義は、図１４（ａ）のオブジェクト型マッピング定義画面のＬＩＮＥかＮＯＤＥのチェックボタンをチェックするだけで割り当てできる。R-object の表示属性生成メソッドの選択と参照属性と実体属性のマッピング定義は、図１５（ａ）のR-object の参照属性マッピング定義画面から行える。対象オブジェクト、選択メソッド、マッピング属性は、該当箇所をマウスクリックすると選択可能なメニューが表示され、容易に選択できる。図１５（ｂ）の実体属性選択ダイアログは、参照属性項目名のマッピングしたい項目（Ｒ#）をクリックすると表示される。

【００４６】図１６は、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるオブジェクト配置座標生成処理のオブジェクト配置メソッドの代表例を示す図である。パターンは、実体間の関係情報を元にノード配置を決定するパターン１（１３０１）、指定された情報を元にノード配置線にノードを配置し、ラインの両端情報からノード通過線上に始終点ノード／通過ノードを配置するパターン２（１３０２）、指定された情報を元にノードをノード配置エリア上に、ノードに包含されるサブノードをノード上に配置し、ラインの始終点情報からサブノード間を接続するパターン３（１３０３）、指定された２つの属性からノードの相対位置を決定し、ラインを構成するサブラインから関連ノードを抽出しラインを配置するパターン４（１３０４）の４種類を例として示す。

【００４７】図１７は、前述のマッピング定義とオブジェクト操作メソッド使用の定義を変更して得られるビジュアル化パターンのバリエーションの例を示す図である。最初に初期パターン図（１４０１）が設定されたと仮定して、オブジェクトタイプ（ノード、ライン）を変更することにより得られるオブジェクトタイプ変更パターン図（１４０２）、ノード配置の情報源を変更して得られるノード配置情報源変更パターン図（１４０３）、ラインの配置方法を変更して得られるライン配置法変更パターン図（１４０４）、ノードの配置方法を変更して得られるノード配置法変更パターン図（１４０５）、ノード配置の情報源に座標属性（Ｚ軸）を加えて３次元で得られる座標属性追加パターン図（１４０６）のような表現のバリエーションが多様に選択することが可能となる。上記のバリエーションは、ユーザの注目したい点に応じて選択する。

【００４８】上述したように、本発明のデータベース情報ビジュアル化ＡＰ開発支援システムは、

（ａ）入力側のデータベースのスキーマ定義と出力側の表示実体のスキーマ定義、および両スキーマ定義間のマ

ッピング記述スクリプトからデータベース検索および検索結果の編集にかかわるメソッドの集合を生成する手段と、

（b）表示実体をどのような図形で表現するかに関係する以下の定義に関するユーザ記述を翻訳して、該当のオブジェクトにメッセージを送信する手段と、（1）表示実体と画面オブジェクト型間のマッピングに関する定義、（2）画面オブジェクトの形状に関する属性情報生成に関するメソッドとそのメソッドで属性情報生成に使用する表示実体の属性情報に関する定義、（3）画面オブジェクトの配置に関する配置座標変換に関するメソッドとそのメソッドで配置座標変換に使用する表示実体の属性情報に関する定義、

（c）上記の（b）で示した図形表現に関する定義を何時、どの順序で実行するかに関するシナリオ定義に関するユーザ記述を翻訳して、該当のオブジェクトやメニューのメソッドとして登録する手段と、

（d）上記の（b），（c）の定義を対話的に入力できる入力画面の提供、入力された情報を翻訳して、該当のオブジェクトにメッセージを送信したり、該当のオブジェクトやメニューのメソッドとして登録する手段、また、（b），（c）の定義を記述言語により事前に定義し、APとして登録することにより、繰り返し実行できる手段と、

（c）上記で作成された表示に関する情報をユーザが選択したGUIツールに合わせて変換し、その情報をGUIに転送する手段とを有する。

【0049】そして、本発明のデータベース情報ビジュアル化AP開発支援システムでは、データベースに蓄積される一般的な文字・数値情報を対象にノード型やライン型の画面オブジェクトの図形表現でビジュアル化するAPを、図形情報生成に関するマッピング定義と、実行順序に関するシナリオ定義をユーザが記述することにより、図形情報生成の詳細な論理を記述することなく、簡易に開発できる。更に、ユーザの入出力定義により、データベースから任意の情報単位を画面オブジェクトに対応させることや、画面オブジェクトを任意のGUIツールに出力させることができる。

【0050】

【発明の効果】以上説明したように、本発明によれば、ユーザは入出力のスキーマ定義と変換スクリプトを記述するだけで文字・数値情報を蓄積するデータベースから適当な情報単位を選択的に抽出して、表示装置上の画面オブジェクトとして表示することが可能になる。また、ユーザは選択した情報単位をライン型かノード型のどちらのオブジェクト型で表現するか、どの属性を使用してオブジェクト配置やオブジェクト形状で決めるか、イベント対応にどの配置メソッドを選択的に操作するかを定義するだけで、ノード型とライン型の画面オブジェクトとそのオブジェクト間の位置関係を複数組み合わせた多様なビジュアル化表現が可能になる。また、表示するGUIツールは、GUIツール毎に表示属性の形式変換のための情報変換定義をすると、GUIツールの選択もシナリオ記述で可能となる。

【0051】このように本発明のデータベース情報ビジュアル化AP開発支援システムでは、文字・数値のデータベースの情報をノードとラインのオブジェクトで表現し、その属性を使用して多様な表現パターンを生成するAPを、簡単なシナリオ記述あるいは対話型の情報定義により簡易に開発することができる。

【0052】また、本発明によれば、画面オブジェクトの形、色、大きさ等の形状を決める表示属性生成メソッドの場合、ユーザはシステムが用意する表示属性生成メソッドとそれに使用する表示実体の属性情報を指定する。この属性情報が数値情報の時には、パラメータとして昇順か降順かの指定と、値の幅を、また文字情報の時には、ユーザ変換表指定かアルファベット順か文字情報の内部コード順かの指定と、変換表名を指定するだけで、表示属性が生成される。このように、ユーザは表示情報生成メソッドと表示情報生成で参照する表示実体の属性情報および表示情報生成メソッドに必要なパラメータを指定するだけで、表示属性の生成に関する詳細なアルゴリズムを記述することなしに、表示属性が生成でき、画面オブジェクトを自動的に表示できるという効果がある。

【0053】更に、本発明によれば、画面オブジェクトの配置座標を決める表示情報生成の場合、ユーザはシステムが用意する配置座標変換メソッドとそのメソッドで参照する表示実体の属性情報を指定する。

【0054】ノード型のオブジェクトに対しては、座標変換メソッドとして、（a）3つの属性情報を使用する3次元座標変換メソッド、（b）属性情報を比例的に表示座標に割り当てる比例的座標変換メソッド、（c）属性情報を基に表示空間の座標にノードの重複が発生しないように相対的に割り当てる相対的座標変換メソッド、（d）属性情報により定義された表示領域に割り当てる割当的座標変換メソッド、（e）属性情報の値の順序に従って配置する順序型座標変換メソッド等の座標変換メソッドの指定と、これらの変換メソッドで参照する表示実体の属性情報を定義する。

【0055】ライン型のオブジェクトに対しては、座標変換メソッドとしてノード間を直線で接続する直線的ライン座標変換メソッド、ノード間を接続する複数のライン型オブジェクトの重複を排除するようにノード上の始終点を、ノード上にあらかじめ対角線上に用意した接続点から選択して表示する間接的ライン座標変換メソッド、ノード間の複数ライン型オブジェクトを集約して1本のライン型オブジェクトで表示する集約的ライン座標変換メソッド、ライン型オブジェクトがノード型オブジェクトを通過する時はノード型オブジェクトの上に表示

し、ノード型オブジェクトで終端するときは、ノード型オブジェクトの下に表示する通過型ライン座標変換メソッド等の座標変換メソッドの指定と、これらの変換メソッドで参照する表示実体の属性情報を定義する。

【００５６】このように、ユーザは座標変換メソッドとメソッドで参照する表示実体の属性情報および変換メソッドに必要なパラメータを指定するだけで、表示属性情報の生成に関するアルゴリズムを記述することなしに、表示属性が生成でき、画面オブジェクトを自動的に表示できるという効果がある。

【００５７】また、本発明によれば、ユーザによる表示情報生成に関する各種の指定を、対話型で表示装置の画面上から指定できるモードと、テキストファイル形式のシナリオ記述により事前に登録して実行できるモードを可能とすることにより、ＡＰ作成時の機能検証の容易化、短時間化と機能確認後のＡＰ作成の容易化、短時間化を図れるという効果がある。

【００５８】更に、本発明によれば、ユーザによる表示情報生成に関する各種の指定を、ＡＰのイベントの状態遷移記述中に定義することにより、イベント対応にデータベースからの表示実体の選択や、表示実体の図形表現を変更することを記述可能とし、連続的な図形表現の変更や、イベント対応の図形表現の変更を可能とするという効果がある。

【００５９】また、本発明によれば、多種多様のＧＵＩツールとは独立に表示実体から表示情報オブジェクトの情報への生成・変換が可能であり、表示情報オブジェクトから画面オブジェクトへの情報変換をＧＵＩツール対応に追加することにより、多種多様のＧＵＩへの拡張が容易であるという効果がある。

【図面の簡単な説明】

【図１】本発明の一実施例に係わるデータベース情報ビジュアル化ＡＰ開発支援システムの構成を示すブロック図である。

【図２】図１のデータベース情報ビジュアル化ＡＰ開発支援システムに使用されている表示実体入力手段の構成（情報源ＤＢがＲＤＢの場合）を示す図である。

【図３】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける入出力スキーマ定義と変換スクリプト記述例を示す図である。

【図４】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける変換スクリプト構文の構成例を示す図である。

【図５】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるオブジェクトクラスの継承定義の例を示す図である。

【図６】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるオブジェクトクラスの属性・メソッド定義の例を示す図である。

【図７】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける表示情報生成のためのマッピング定義の構成例を示す図である。

【図８】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるマッピング定義の翻訳・実行制御の構成を示す図である。

【図９】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける登録型のマッピング定義記述例を示す図である。

【図１０】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおいて操作メソッドのパラメータ定義の記述例を示す図である。

【図１１】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける登録型のユーザシナリオ処理記述例を示す図である。

【図１２】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるＧＵＩ入出力手段の構成を示す図である。

【図１３】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける対話型の入出力定義・マッピング定義の投入画面例のうち、入出力スキーマ定義画面および入出力変換情報定義画面を示す図である。

【図１４】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける対話型の入出力定義・マッピング定義の投入画面例のうち、オブジェクト型マッピング定義および入出力変換operation 選択ダイアログを示す図である。

【図１５】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおける対話型の入出力定義・マッピング定義の投入画面例のうち、R-object の参照属性マッピング定義画面および実体属性選択ダイアログを示す図である。

【図１６】本発明のデータベース情報ビジュアル化ＡＰ開発支援システムにおけるオブジェクト配置座標生成処理のオブジェクト配置メソッドの代表例を示す図である。

【図１７】マッピング定義とオブジェクト操作メソッド使用の定義を変更して得られるビジュアル化パターンのバリエーションの例を示す図である。

【符号の説明】

１０１　情報源ＤＢ
１０２　表示実体入力手段
１０３　表示情報ＤＢ
１０４　ＧＵＩ入出力手段
１０５　ＧＵＩ装置
１０６　エンドユーザ
１０７　対話型投入手段
１０８　登録型投入手段
１０９　シナリオ定義翻訳
１１０　入力定義翻訳
１１１　マッピング定義翻訳

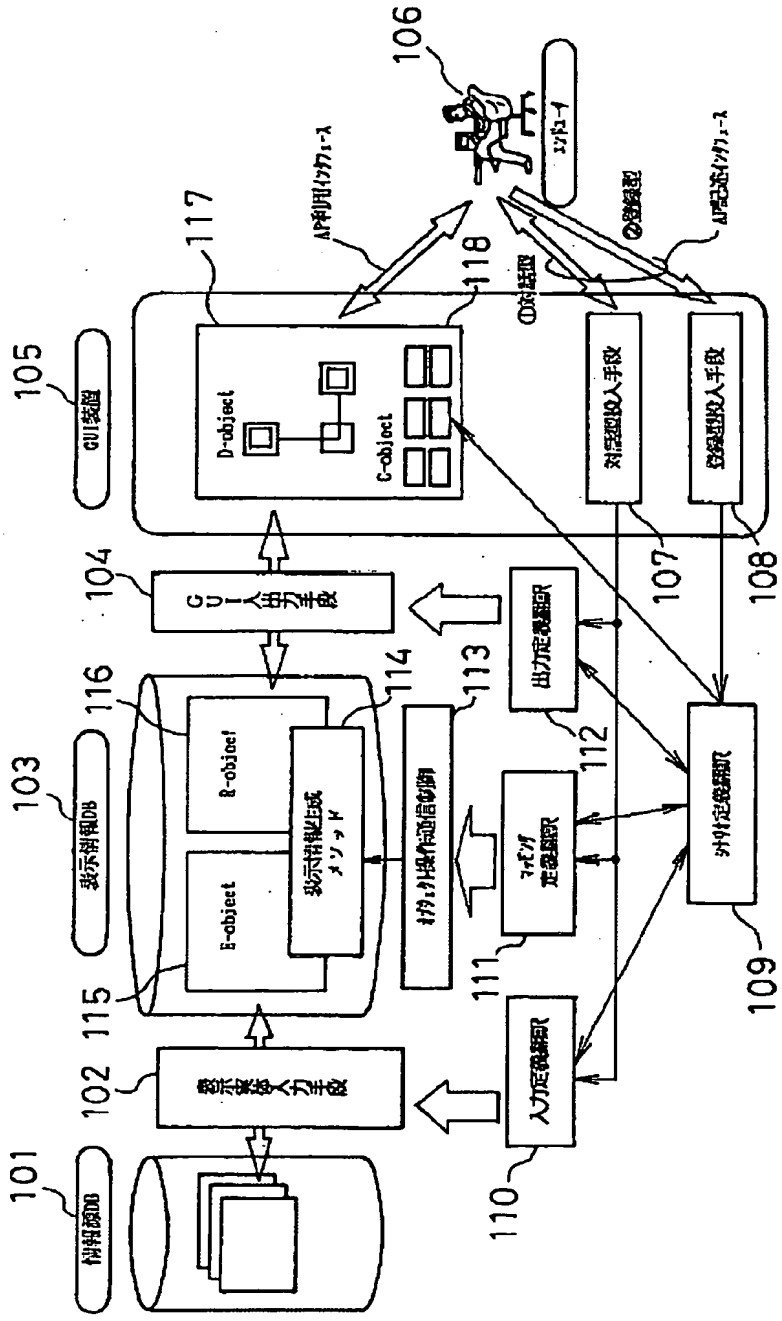
15

112　出力定義翻訳
113　オブジェクト操作通信制御
114　表示情報生成メソッド
115　E-object　(表示実体)

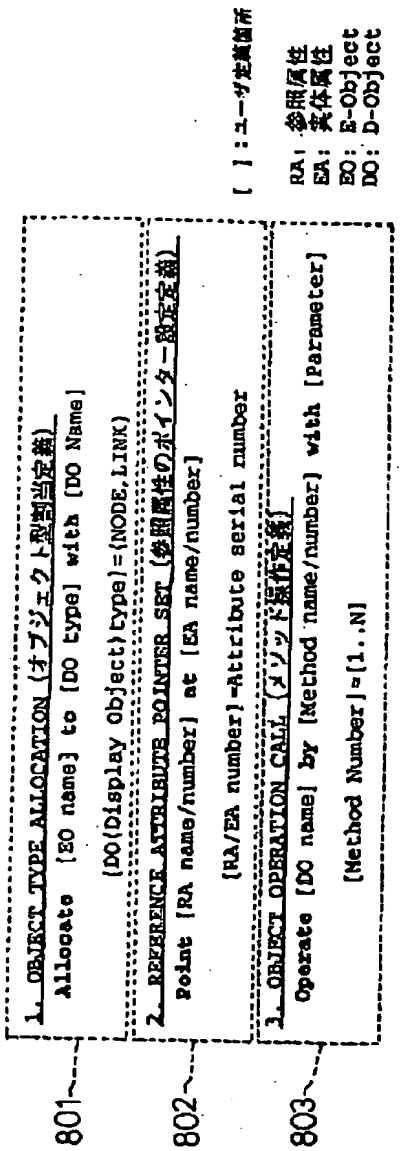
16

116　R-object　(表示情報オブジェクト)
117　D-object　(画面オブジェクト)
118　C-object　(制御オブジェクト)

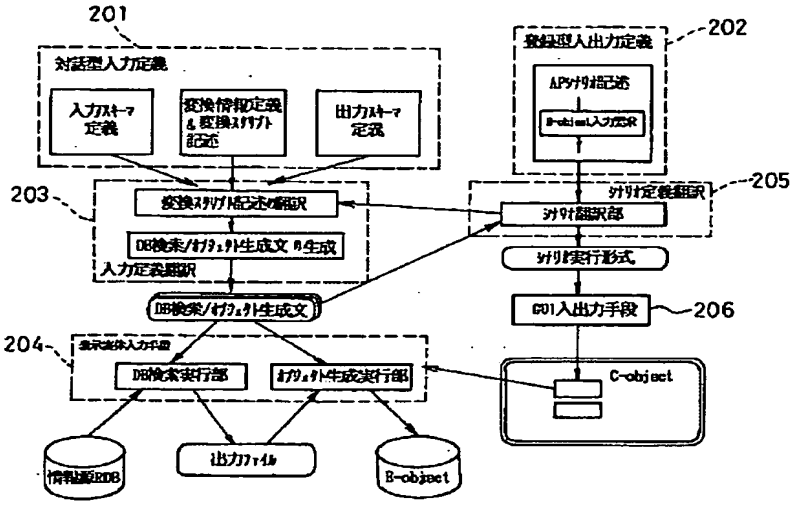
【図1】



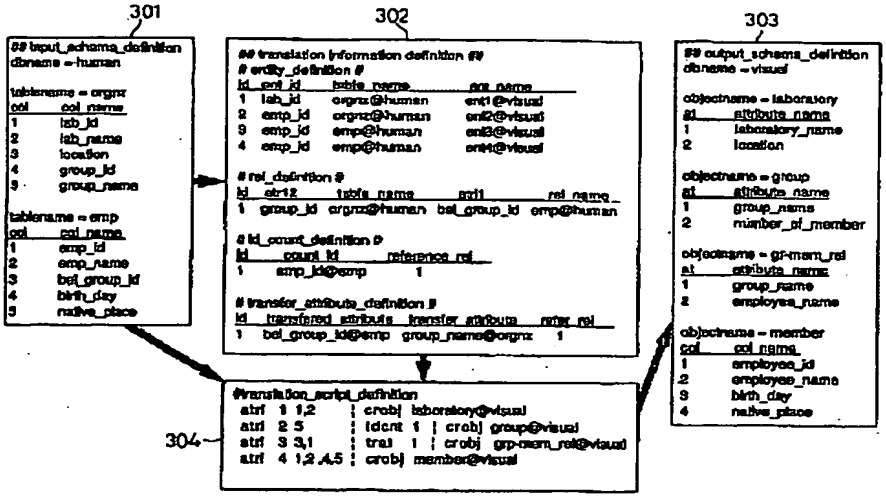
【図9】



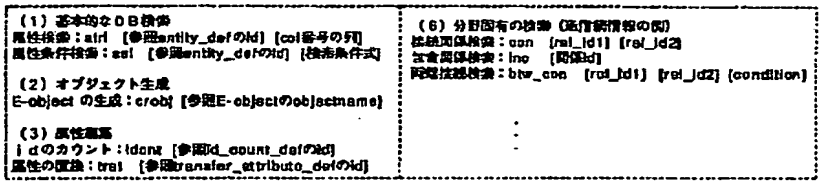
【図２】


201
対話型入力定義
入力ｽｷｰﾏ定義
変換情報定義＆変換ｽｸﾘﾌﾟﾄ記述
出力ｽｷｰﾏ定義
202
登録型入出力定義
APｽｸﾘﾌﾟﾄ記述
203
変換ｽｸﾘﾌﾟﾄ記述の解釈
DB検索/ｵﾌﾞｼﾞｪｸﾄ生成文の生成
入力定義解釈
205
ｽｸﾘﾌﾟﾄ定義解釈
ｽｸﾘﾌﾟﾄ解釈部
ｽｸﾘﾌﾟﾄ実行形式
DB検索/ｵﾌﾞｼﾞｪｸﾄ生成文
GUI入出力手段
206
204
表示実体入力手段
DB検索実行部
ｵﾌﾞｼﾞｪｸﾄ生成実行部
C-object
情報源DB
出力ﾌｧｲﾙ
E-object

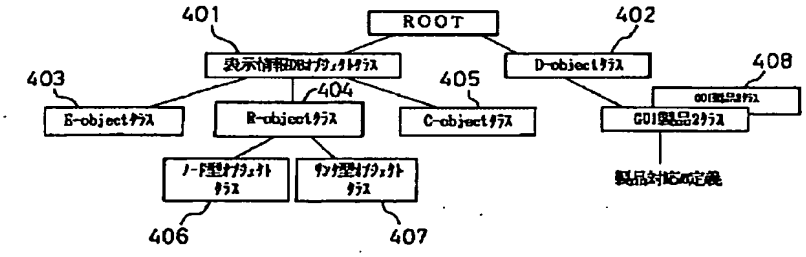
【図３】


301
302
303
304
input_schema_definition
dbname = human
tablename = orgnz
col col_name
1 lab_id
2 lab_name
3 location
4 group_id
5 group_name
tablename = emp
col col_name
1 emp_id
2 emp_name
3 bel_group_id
4 birth_day
5 native_place
translation information definition
entity_definition
id ent_id table_name ent_name
1 lab_id orgnz@human ent1@visual
2 emp_id orgnz@human ent2@visual
3 emp_id emp@human ent3@visual
4 emp_id emp@human ent4@visual
rel_definition
id attr2 table_name ent1 rel_name
1 group_id orgnz@human bel_group_id emp@human
id_count_definition
id count_id reference_rel
1 emp_id@emp 1
transfer_attribute_definition
id transferred attributs transfer attributs relay_rel
1 bel_group_id@emp group_name@orgnz 1
output_schema_definition
dbname = visual
objectname = laboratory
at attribute_name
1 laboratory_name
2 location
objectname = group
at attribute_name
1 group_name
2 number_of_member
objectname = gr-mem_rel
at attribute_name
1 group_name
2 employee_name
objectname = member
col col_name
1 employee_id
2 employee_name
3 birth_day
4 native_place
#translation_script_definition
atrl 1 1,2 | crobj laboratory@visual
atrl 2 5 | ident 1 | crobj group@visual
atrl 3 3,1 | trsl 1 | crobj grp-mem_rel@visual
atrl 4 1,2,4,5 | crobj member@visual

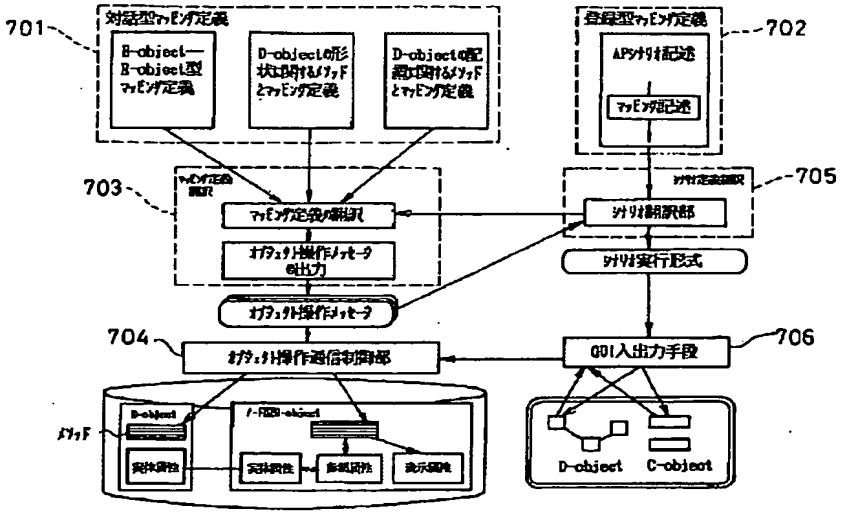
【図４】


（１）基本的なＤＢ検索
属性検索：atrl　[参照entity_defのid]　[col番号の列]
属性条件検索：asl　[参照entity_defのid]　[検索条件式]
（２）オブジェクト生成
E-object の生成：crobj　[参照E-objectのobjectname]
（３）属性編集
ｉｄのカウント：idcnz　[参照id_count_defのid]
属性の置換：trsl　[参照transfer_attributo_defのid]
（６）分野固有の検索（通信網情報の例）
経路関係検索：con　[rel_id1]　[rel_id2]
包含関係検索：inc　[関係id]
時間依存関係検索：btw_con　[rel_id1]　[rel_id2]　[condition]

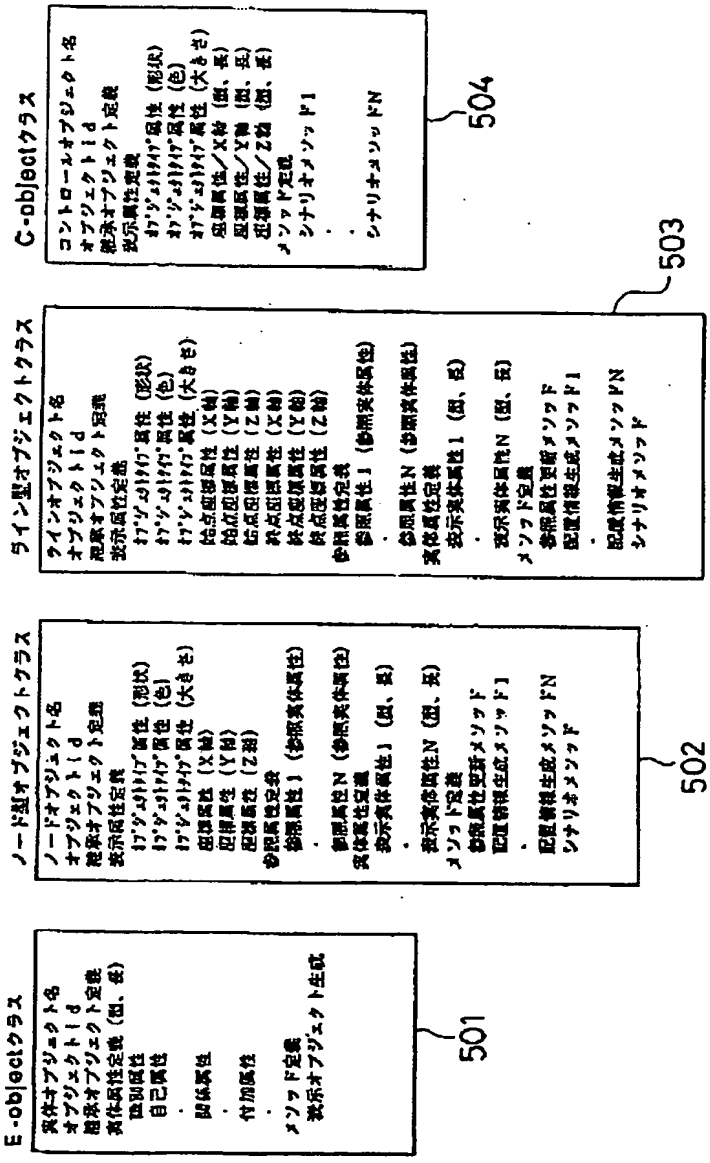
【図５】


401
ROOT
402
表示情報DBオブジェクトクラス
D-objectクラス
403
405
408
404
E-objectクラス
R-objectクラス
C-objectクラス
GOI製品クラス
製品対応の定義
406
407

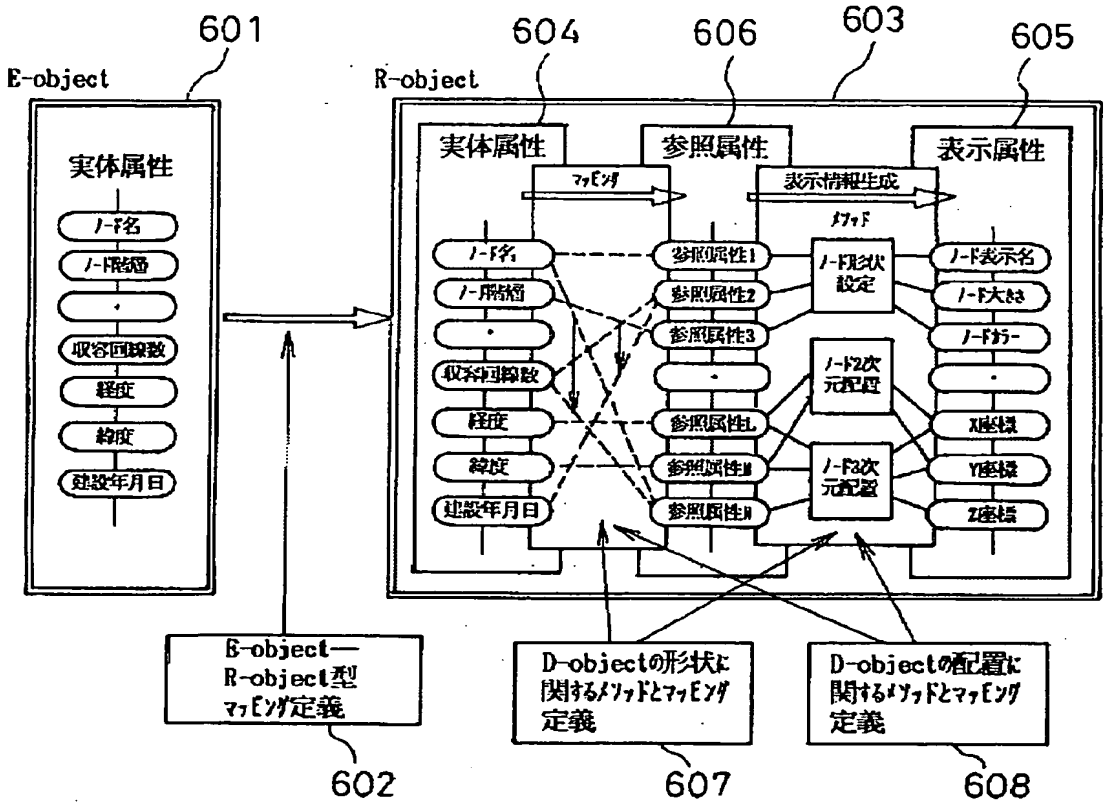
【図８】


701
対応型マッピング定義
R-object—R-object型マッピング定義
D-objectの形状に関するメソッドとマッピング定義
D-objectの配置に関するメソッドとマッピング定義
登録型マッピング定義
702
APシナリオ記述
マッピング記述
703
マッピング定義の解釈
オブジェクト操作メッセージ生成
705
シナリオ解釈部
シナリオ実行形式
オブジェクト操作メッセージ
704
オブジェクト操作通信制御部
GOI入出力手段
706
メソッド
D-object
C-object

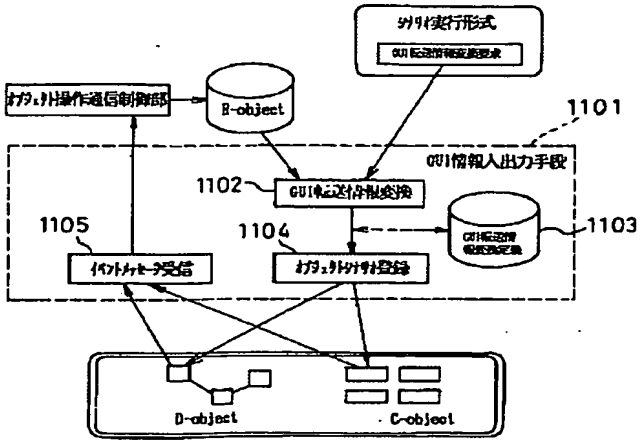
【図6】


E-objectクラス
実体オブジェクト名
オブジェクトid
相手オブジェクト定義
実体属性定義（出、受）
識別属性
自己属性
・
関係属性
・
付加属性
・
メソッド定義
表示オブジェクト生成
501
ノード型オブジェクトクラス
ノードオブジェクト名
オブジェクトid
相手オブジェクト定義
表示属性定義
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（形状）
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（色）
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（大きさ）
座標属性（X軸）
座標属性（Y軸）
座標属性（Z軸）
参照属性定義
参照属性1（参照実体属性）
・
参照属性N（参照実体属性）
実体属性定義
表示実体属性1（出、受）
・
表示実体属性N（出、受）
メソッド定義
参照属性更新メソッド
配置情報生成メソッド1
・
配置情報生成メソッドN
シナリオメソッド
502
ライン型オブジェクトクラス
ラインオブジェクト名
オブジェクトid
相手オブジェクト定義
表示属性定義
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（形状）
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（色）
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（大きさ）
始点座標属性（X軸）
始点座標属性（Y軸）
始点座標属性（Z軸）
終点座標属性（X軸）
終点座標属性（Y軸）
終点座標属性（Z軸）
参照属性定義
参照属性1（参照実体属性）
・
参照属性N（参照実体属性）
実体属性定義
表示実体属性1（出、受）
・
表示実体属性N（出、受）
メソッド定義
参照属性更新メソッド
配置情報生成メソッド1
・
配置情報生成メソッドN
シナリオメソッド
503
C-objectクラス
コントロールオブジェクト名
オブジェクトid
相手オブジェクト定義
表示属性定義
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（形状）
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（色）
ｵﾌﾞｼﾞｪｸﾄﾀｲﾌﾟ属性（大きさ）
座標属性／X軸（出、受）
座標属性／Y軸（出、受）
座標属性／Z軸（出、受）
メソッド定義
シナリオメソッド1
・
・
シナリオメソッドN
504

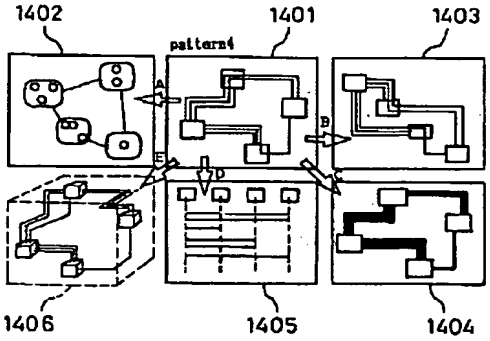
【図７】



【図１２】

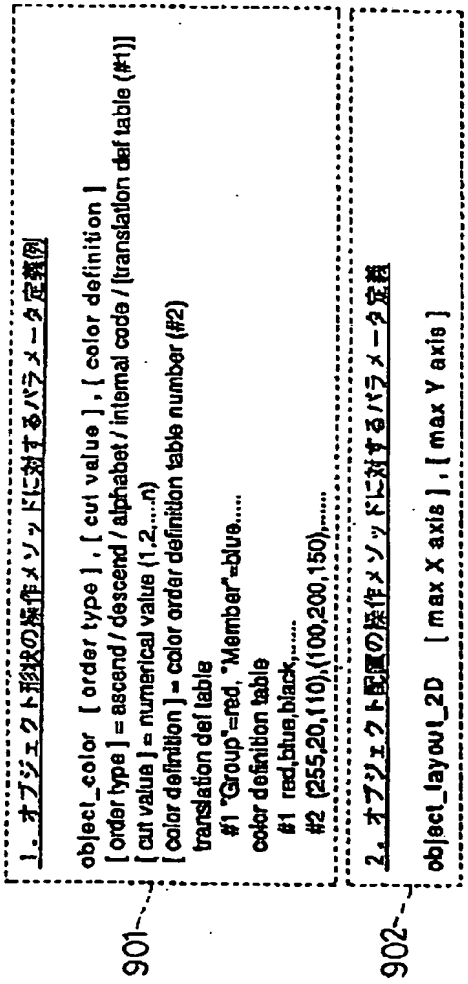


【図１７】

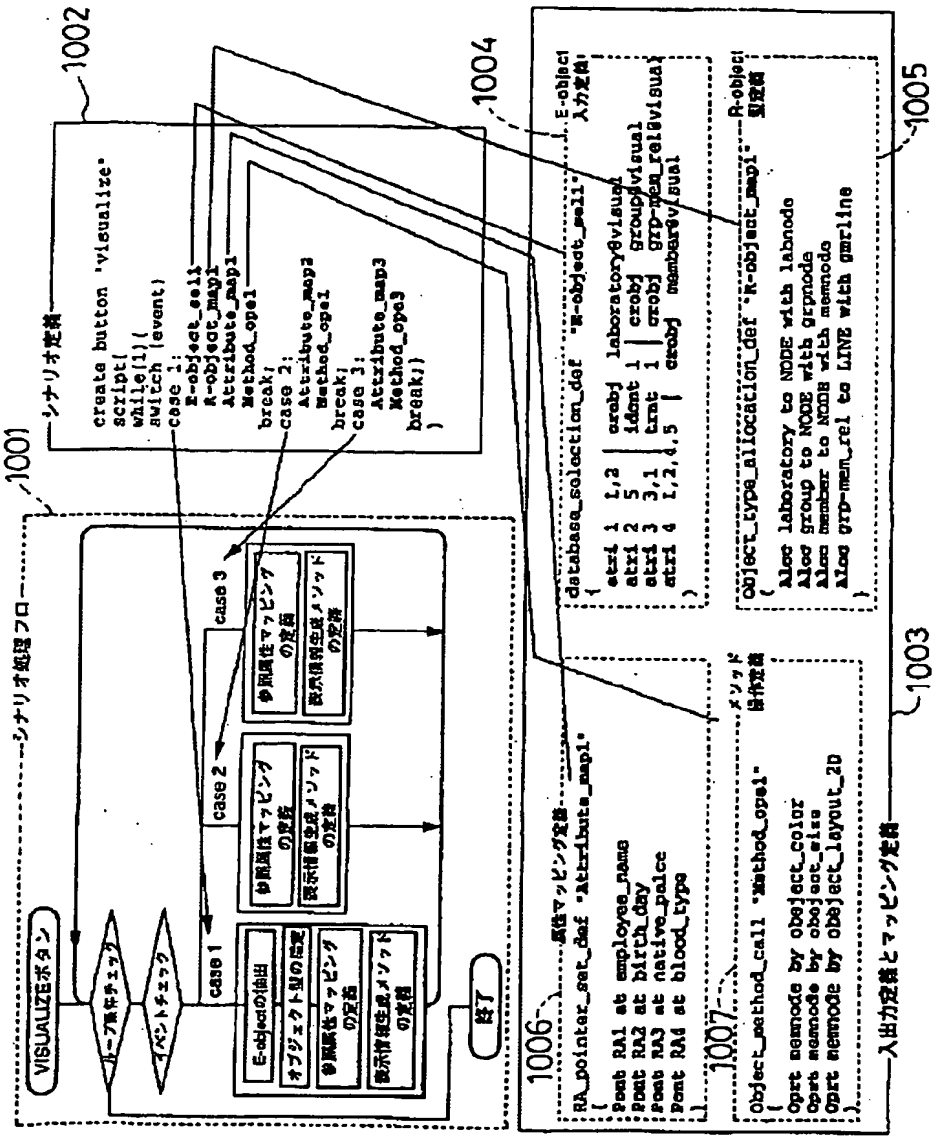


A:オブジェクト図, B:ノード配置情報源 C:ライン配置方法
D:ノード/ライン配置方法, E:配置アルゴリズム

【図10】

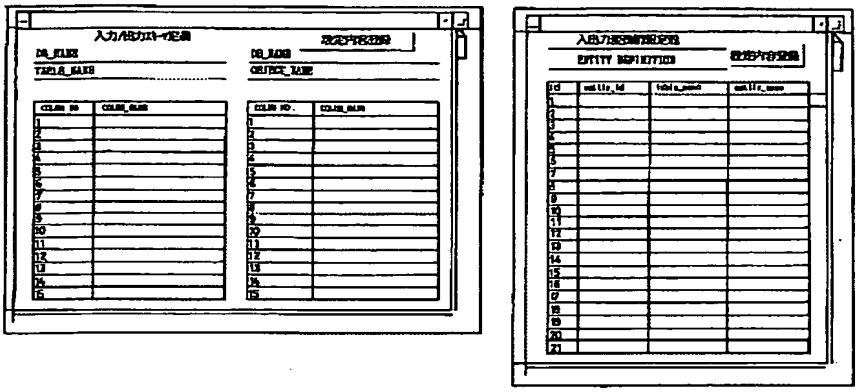

1．オブジェクト形状の操作メソッドに対するパラメータ定義例
object_color [order type] , [cut value] , [color definition]
[order type] = ascend / descend / alphabet / internal code / [translation def table (#1)]
[cut value] = numerical value (1,2,....n)
[color definition] = color order definition table number (#2)
translation def table
#1 "Group"=red, "Member"=blue.....
color definition table
#1 red,blue,black,.....
#2 (255,20,110),(100,200,150),.....
901
2．オブジェクト配置の操作メソッドに対するパラメータ定義
object_layout_2D [max X axis] , [max Y axis]
902

【図11】


1001
1002
1003
1004
1005
1006
1007
シナリオ処理フロー
VISUALIZEボタン
ループ終了チェック
イベントチェック
case 1
case 2
case 3
E-objectの抽出
オブジェクト型の判定
参照属性マッピングの定義
表示情報生成メソッドの定義
参照属性マッピングの定義
表示情報生成メソッドの定義
参照属性マッピングの定義
表示情報生成メソッドの定義
終了
シナリオ定義
create button 'visualize'
script{
while(1){
switch (event)
case 1:
E-object_sel1
R-object_map1
Attribute_map1
Method_ope1
break;
case 2:
Attribute_map2
Method_ope2
break;
case 3:
Attribute_map3
Method_ope3
break;
}
E-object
入力定義
database_selection_def "E-object_sel1"
{
atri 1 1,2 | oraobj laboratory&visual
atri 2 5 | ident 1 | oraobj group&visual
atri 3 3,1 | tmt 1 | oraobj grp-men_rel&visual
atri 4 1,2,4,5 | oraobj member&visual
}
R-object
出力定義
object_type_allocation_def "R-object_map1"
{
Alec laboratory to NODE with labnode
Alec group to NODE with grpnode
Alec member to NODE with memnode
Alec grp-men_rel to LINE with gmrline
}
入出力定義とマッピング定義
属性マッピング定義
RA_pointer_set_def "Attribute_map1"
{
Post RA1 at employee_name
Post RA2 at birth_day
Post RA3 at native_palce
Post RA4 at blood_type
}
メソッド
操作定義
Object_method_call "Method_ope1"
{
Oport mamode by object_color
Oport mamode by object_size
Oport mamode by object_layout_2D
}

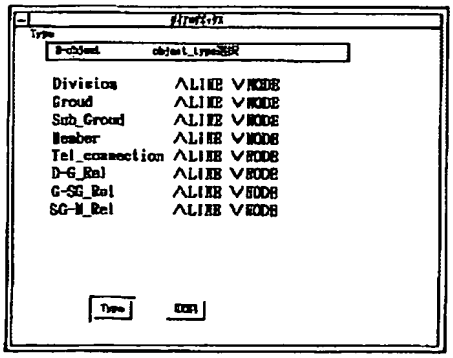
【図１３】

(a)　　(b)

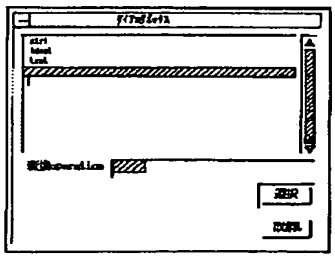


【図１４】

(a)

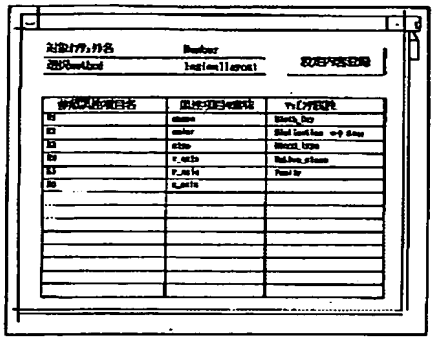

Division　ALIKE VNODE
Groud　ALIKE VNODE
Sub_Groud　ALIKE VNODE
Member　ALIKE VNODE
Tel_connection　ALIKE VNODE
D-G_Rel　ALIKE VNODE
G-SG_Rel　ALIKE VNODE
SG-M_Rel　ALIKE VNODE

(b)

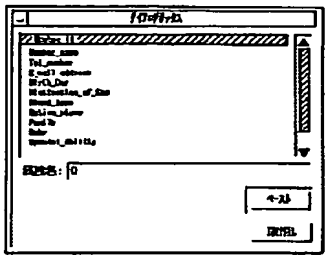


【図１５】

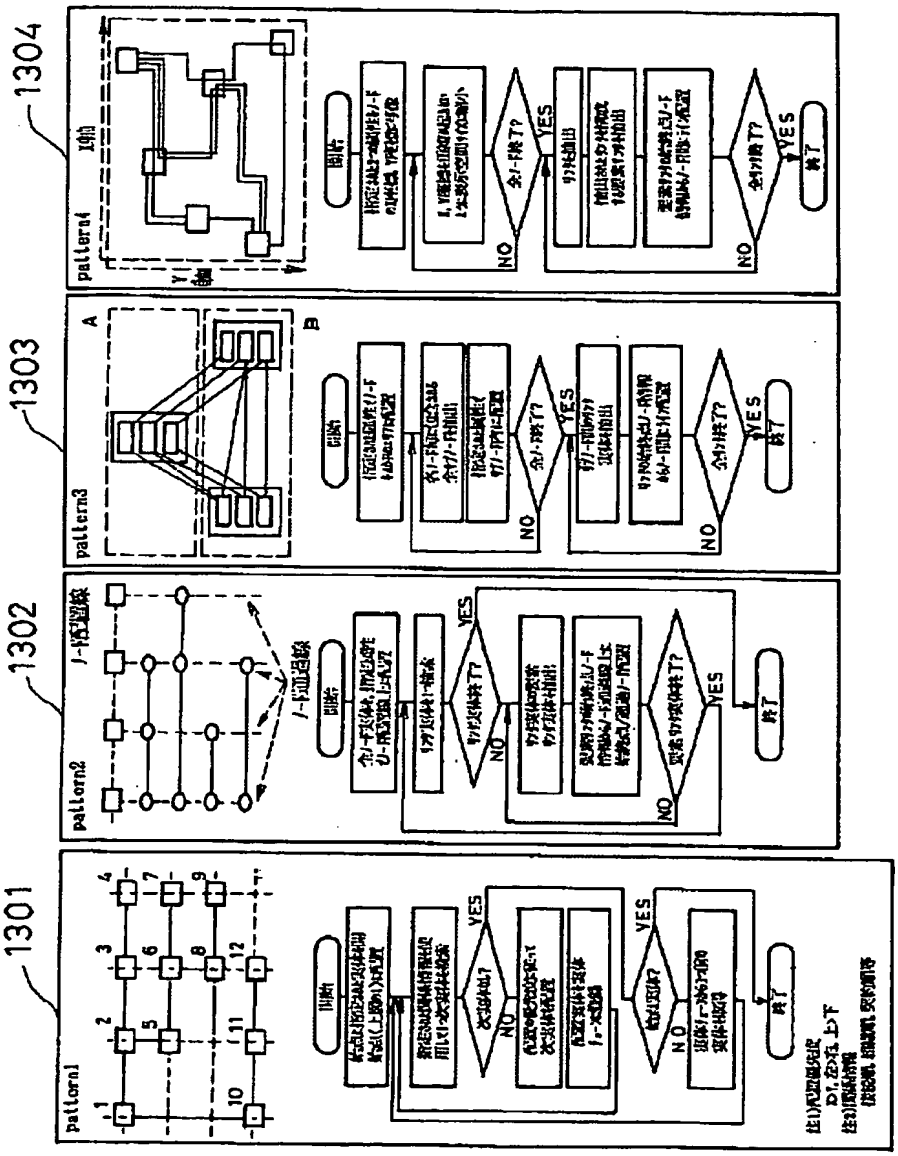
(a)



(b)



【図16】


1304
1303
1302
1301
pattern4
pattern3
pattern2
pattern1
A
B
YES
NO
終了

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